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This conference, sponsored by the U.S. Environmental Protection Agency and the U.S. Dept. of Transportation, was held to improve communication between those concerned with air quality management and those concerned with land use and transportation planning. The sessions are aimed at identifying the major problems and issues that exist in fitting together land use and transportation plans and policies with air quality objectives and programs. There are sessions dealing with the legal and policy setting situation, planning and air quality maintenance at the urban-metropolitan scale, regional air quality management programs and information needed by land and transportation planners and managers.

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American Institute of Planners
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International City Managers Association
National Association of Counties
United States Department of Housing and Urban Development
Urban Land Institute

in cooperation with

Continuing Education, School of Public Health

on the campus of the

University of North Carolina at Chapel Hill
Chapel Hill, North Carolina
November 13-15, 1974

edited by

Maynard M. Hufschmidt
and Asta C. Cooper

PREFACE

The National Conference on Land Use and Transportation Planning and Air Quality Management was held from November 13 to November 15, 1974, on the campus of the University of North Carolina at Chapel Hill. The primary sponsors were the Triangle Universities Consortium on Air Pollution, the United States Department of Transportation, and the United States Environmental Protection Agency. Other sponsors were the American Institute of Planners, American Society of Planning Officials, the International City Managers Association, National Association of Counties, U.S. Department of Housing and Urban Development, and the Urban Land Institute.

All of the papers that were presented at the conference are included in the volume. Comments of paper discussants and of individuals invited to make summary statements at the final conference session are included if they were provided in written form.

Particular thanks are due to Dr. Lawrence Kornreich and Ms. Deborah Powell, Executive Director and Administrative Secretary, respectively, of the Triangle Universities Consortium on Air Pollution, for organizing and managing the conference and handling the details of publishing these proceedings; and to the staff of Continuing Education, School of Public Health at the University of North Carolina at Chapel Hill, for their help in handling the details of the conference administration.

Finally, a debt of appreciation is owed to the members of the Conference Steering Committee, including Ronald Venezia of the Environmental Protection Agency, Eugene Lehr and Ali Sevin of the Department of Transportation, and Professors F. Stuart Chapin, Jr., C. Gorman Gilbert, Edward J. Kaiser, and David H. Moreau of the University of North Carolina Department of City and Regional Planning for arranging the conference program and participating in the proceedings.

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TABLE OF CONTENTS

Preface iii

Steering Committee iv

Session Chairmen iv

Introduction
by *Maynard M. Hufschmidt* 1

Session I — Legal and Policy Setting 3

The Clean Air Act: Land Use and Transportation Implications *by Daniel R. Mandelker* 5

Land Use: Current Policy and Planning Setting *by Robert C. Einsweiler* 16

Transportation Policy and Air Quality Management: Some Current Perspectives *by Joseph L. Schofer* 27

Session II — Planning and Air Quality Maintenance at the Urban-Metropolitan Scale 43

An Experience in Relating Transportation, Land Use, and Air Quality Planning
by Paul C. Watt and Wayne Hoffman 45
Comments *by Richard S. DeTurk* 62

Air Quality Management Using Land Use and Transportation Planning and Controls *by Fred C. Hart* 65
Comments *by Charles Z. Szczepanski* 72
Comments *by Alan M. Voorhees* 78

Session III — The Regional Air Quality Management Program 81

Federal, State, and Local Air Quality Management Programs: Transportation and Land Use Implications
by Jean Schueneman 83
Comments *by Elizabeth H. Haskell* 96
Comments *by Michael Prochaska* 101

Transportation and Metropolitan Air Quality
by Norman L. Cooper 104
Comments *by Lane W. Kirkpatrick* 130
Comments *by Diana H. Wahl* 136

Session IV — Inputs From Planners and Managers 149

Information Requirements of Land Use Planners Concerned With Air Quality Management
by George Hagevik 151
Comments *by David R. Miller* 161

What Transportation Planners Need
by George V. Wickstrom 164
Comments *by Harold Kassoff* 175

Data Requirements for the Design and Implementation of Strategies for Maintenance of Clean Air Goals
by John J. Roberts 184
Comments *by David H. Moreau* 194

Session V — Invited Comments and Conference Summary 197

Invited Comments *by Diana H. Wahl* 199
Norman L. Cooper 201
Linda Goldman 203
Everett Knight 206
Charles Z. Szczepanski 207
John Tuteur 211
Suzanne Wellborn 213

Summary Remarks *by F. Stuart Chapin, Jr.* 219
C. Gorman Gilbert 221
Milton Heath 223
David H. Moreau 226
Maynard M. Hufschmidt 228

List of Participants 229

INTRODUCTION

Maynard M. Hufschmidt
Professor of Planning and Environmental Sciences & Engineering
University of North Carolina at Chapel Hill

On behalf of the Triangle Universities Consortium on Air Pollution and the University of North Carolina I welcome you to Chapel Hill. This welcome also comes from the primary sponsors of the conference, the U.S. Environmental Protection Agency and the U.S. Department of Transportation, as well as from the associate sponsors—the American Institute of Planners, American Society of Planning Officials, International City Managers Association, National Association of Counties, U.S. Department of Housing and Urban Development, and the Urban Land Institute.

By means of this conference we are seeking to improve communication between those concerned with air quality management on the one hand, and those concerned with land use and transportation planning on the other hand. By **those concerned** we mean not only the Federal, state, and local officials with responsibilities in these fields, but also professionals, research scholars, teachers, and members of various interest groups—environmentalists, developers—with interests and responsibilities in air quality, land use, or transportation.

Major tasks lie ahead in carrying out the provisions of the Clean Air Act to attain and maintain the primary national air quality standards and to avoid significant deterioration of air quality generally. It is obvious that much better communication than now exists is needed between land use and transportation planners and air quality managers, especially on the local scene —the city, county, council of governments region, and Air Quality Maintenance area. We consider this conference to be a beginning contribution toward meeting this need. We hope that the links established here will be strengthened and expanded, and that the accomplishments of this conference will be but a first step in a continuing process of communication.

We hope that the sessions will identify the major problems and issues that exist in fitting together land use and transportation plans and policies with air quality objectives and programs; we hope, also, that the sessions will lead to the discovery of opportunities for working together—that is, cases and situations where community objectives become translated into land use, transportation, and air quality plans and programs that are mutually supporting.

It is our intention to publish the proceedings of this conference as rapidly as feasible, and with the help of EPA and DOT, to distribute copies of the report very widely. In this way we hope that the results of the conference will be put to use by as many as possible of those who are working on these problems in states and on the local scene.

Session I

Legal and Policy Setting

Chairman:

Milton Heath, University of North Carolina
at Chapel Hill

The Clean Air Act: Land Use and Transportation Implications

Daniel R. Mandelker
Howard A. Stamper Professor of Law
Washington University (St. Louis)

When Congress moved in 1970 to amend and strengthen the National Clean Air Act,[1] the provisions of the statute authorizing land use and transportation controls received minimal attention. The reduction in air pollution that the statute mandated was to be achieved primarily through source controls on pollution emissions. Increasing awareness of the land use and transportation implications of a clean air strategy has gradually led the Environmental Protection Agency to emphasize land use and transportation controls as an additional necessary major component in air quality improvement. This paper will review the provisions of the Clean Air Act that bear on the implementation of land use and transportation controls, those court decisions that have construed the provisions of the Act authorizing or at least contemplating those controls, and the administrative steps that EPA has so far taken to make these controls effective.

MAJOR PROVISIONS OF THE CLEAN AIR ACT HAVING LAND USE AND TRANSPORTATION IMPLICATIONS

The Clean Air Act contemplated a coordinated Federal-state attack on air pollution. Primary enforcement authority is delegated to the states, which must comply with Federal standards and program requirements, subject to EPA's reserved power both to determine the content of state programs and to take over their enforcement when the state effort is unsatisfactory. We concentrate here on the Federal statutory provisions applicable to stationary sources of pollution. The key to the statutory program for the control of these sources lies in the state implementation plans for the control of air pollution which are required by the Federal Act. These plans are to include a variety of techniques for pollution control, among them such measures "as may be necessary" to the achievement of national pollution abatement objectives, and these additional necessary measures may include "land use and transportation controls."[2] No definition of the scope of these

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controls is provided by the Act, and legislative history as well provides little guidance to the precise form in which these controls should be applied in state air pollution control programs.

State implementation plans must also contain another and more specific control over stationary sources which may also be construed as a land use control measure. The plans must contain a procedure for the review, prior to construction or modification, of a new or modified stationary source of air pollution. Review procedures must be utilized to prevent the construction or modification of a stationary source at any "location" at which the state determines that construction or modification will prevent the "attainment or maintenance" of a national primary or secondary air quality standard.[3] Since there is a specific reference in this provision to controls over the "location" of sources, the review procedure authorized by the statute can be considered as a land use control.

One other provision of the Clean Air Act which has a bearing on land use and transportation controls also needs to be mentioned. States may obtain an extension from EPA of the statutory time limit for meeting the Federal primary standard, but to obtain such an extension must demonstrate to the EPA that they have "considered and applied . . . reasonably available alternative means" of achieving this standard, other than controls over emission sources.[4] These alternative means presumably include land use and transportation controls. Since several states have and will continue to seek extensions in the time required to meet primary standards, a state's failure to include land use and transportation controls in its implementation plan will be considered by EPA when deciding whether or not to grant a statutory extension.

What is lacking from the Clean Air Act, unfortunately, is any provision which can guide the states in providing the necessary intergovernmental arrangements statewide through which these land use and transportation control measures can be implemented. Land use control and transportation powers are ordinarily exercised within the states by units of local government. State air pollution control agencies do not ordinarily possess comparable authority, and indeed may not be the proper agencies at the state level to exercise this authority. With no directive from the national statute which can indicate how these powers are to be distributed within the states, EPA has been left with no statutory guidance on this essential component of a land use and transportation strategy.

INITIAL EPA IMPLEMENTATION OF LAND USE AND TRANSPORTATION STRATEGIES

EPA was at first slow to move in the area of land use controls, although it exhibited no such reluctance in the transportation field. Transportation controls initially proposed by EPA included a wide variety of measures, some of which had direct land use implications. Included among these were stringent controls on parking facilities, including the imposition of substantial parking fees on commuters; the encouragement of carpooling and similar techniques to reduce motor vehicle use; and local measures limiting motor vehicle traffic which were aimed at facilitating the use of public transportation.[5] Early EPA regulations also called for massive controls on gasoline supply, through extensive gasoline rationing in metropolitan areas with severe motor vehicle pollution problems.

In the land use control area, EPA moved more slowly. One minor measure with land use implications in EPA's initial guidelines for state implementation plans required a projection of urban growth and an indication of how expected growth would affect the attainment and maintenance of air quality standards.[6] EPA also dealt with a controversial policy issue that affects the implementation of land use and transportation control measures. Implementation plan guidelines stated that nothing in the guidelines was to prevent a state from taking the "social and economic impact" of its air pollution control strategy into account when deciding on control measures.[7] Since land use and transportation controls clearly have major impacts on social and economic objectives in land development, this directive, though not as clear as it might have been, had a significant effect on the control strategies that states considered for adoption.

FEDERAL COURT ACTIONS AFFECTING LAND USE AND TRANSPORTATION CONTROLS

No sooner had EPA published its initial guidelines for land use and transportation controls than a series of Federal court decisions brought into question the validity of these guidelines as a faithful implementation of the statutory mandate. Court challenges to EPA's actions were especially fruitful because of the latent ambiguities contained in the Act, some of which have been mentioned above. Three major areas of statutory concern prompted some of the more significant of these judicial decisions—the role of EPA in maintaining as well as achieving the national standards; the role, if any, of a nondegradation policy in the implementation of the statutory requirements; and the authority of EPA to extend the various time deadlines for meeting the various requirements imposed by the Act.

When the EPA Administrator granted extensions of time for submitting initial implementation plans to states which had difficulty in devising an adequate transportation control strategy, this action was successfully challenged in Federal court.[8] The court held that the statute did not allow the Administrator to defer the submission of implementation plans, thereby relegating him to the explicit statutory provisions governing state requests for time extensions needed to meet primary standards. This decision, along with massive local protests to the gasoline rationing and other stringent requirements in EPA's original transportation control guidelines, has led as well to EPA's reconsideration of its transportation control strategies.

In this same litigation the Federal court also held, though without explicit direction on what actions by EPA might comply with its decision, that EPA had not required enough of the states in the **maintenance** as well as the achievement of the national standards. As part of the settlement negotiated in this litigation, EPA agreed to impose controls over so-called indirect as well as direct sources of air pollution. Indirect sources are those sources, such as shopping centers and recreational complexes, that do not themselves generate air pollution but which contribute to air pollution through the large number of motor vehicle trips that they attract. How EPA has implemented its indirect source review procedures will also be noted below.

Two Federal cases challenging the New York State plan have now passed on the role of social and economic factors in a state's consideration of "reasonably alternative means" as part of the justification for an extension of the statutory time to meet primary standards. The court decision dealing with the land use controls element of the state implementation plan is especially instructive.[9] Actions with land use implications for the New York region were rejected because of their social unacceptability. Included among the rejected alternatives was the gradual elimination of all power steam plants from the polluted areas of the region. EPA's decision to grant a time extension was accepted in a cautious opinion by the court, which noted that proposals such as the steam plant elimination proposal would be effective only in the longer run and would not be helpful in the initial compliance with the statutory timetable. The court also approved a time extension requested for the state's transportation controls for similar reasons.[10] On the other hand, the Federal courts have been divided on the extent to which they have been willing to accept social and economic considerations as a justification for control strategies contained in initial implementation plan proposals.[11]

Of even greater importance for EPA's land use and transportation strategies is a decision by lower Federal courts, ultimately affirmed without opinion by a divided Supreme Court, that read a nondegradation requirement into the Clean Air Act.[12] This problem arises because some areas of the country presently have air whose quality is better than what the national standards adopted by EPA would require. The question is whether the Act contains an implicit requirement—the problem is not addressed explicitly—that the air in these regions may now be allowed to deteriorate further, provided that the national standards are not exceeded.

While the legislative history bearing on the nondegradation issue is conflicting, the lower Federal courts decided that this history weighed in the direction of a finding that a nondegradation requirement was intended. No direction was provided in the court decisions on just how a nondegradation requirement was to be implemented, however, other than a mention in the district court's order that "significant" deterioration of air quality was to be prevented in those areas in which the nondegradation requirement applied.

EPA REACTIONS TO COURT DECISIONS ON AIR QUALITY OBJECTIVES

EPA has now moved on several fronts to modify its guidelines and requirements so that the holdings of these several court decisions can be implemented. Three major actions have been taken by EPA. Regulations have been promulgated requiring the preparation of air quality maintenance plans for air quality regions in which maintenance problems are serious. Regulations have also been promulgated providing for the review of indirect sources, and regulations have been proposed that deal with the problems of nondegradation. In addition, EPA has proposed parking management regulations for those cities that have serious motor vehicle pollution problems.

State implementation plan regulations now require the states to identify and the Administrator to confirm those areas within the state which, "due to current air quality and/or projected growth rate," may have the potential for exceeding any national air quality standard within the succeeding ten-year period.[13] States are then to submit a plan, including any necessary revisions in control strategies or other measures, which will insure that "projected growth and development" will be compatible with the maintenance of air quality standards throughout the ten-year period. Because of the explicit reference in the regulations to control strategies affecting growth and development, air quality maintenance plans can be expected to contain land use control measures as one of the primary tools for the implementation of air quality maintenance plans. This possibility is explicitly recognized by the air quality maintenance planning guidelines that are presently under preparation.

EPA's indirect source regulations apply to major public and private developments that contain associated parking facilities large enough to qualify for regulation under the Act, as well as to major highway and airport proposals.[14] An indirect source, including highways and airports, may not be approved if it will violate an applicable control strategy, or if it will cause or exacerbate a violation of the national carbon monoxide standard in any region. Other pollutants associated with these developments are not tested because there presently are no modeling techniques that can measure their impact. An applicant for an indirect source permit may use one of several methods to show compliance with this standard. As one possibility, the regulations suggest modifications in the site design for submitted projects which will allow the applicant to modify traffic flows within his development so that the carbon monoxide standard is not violated.

EPA has proposed regulations to prevent "significant deterioration" of the air in those areas in which the air is presently better than what the national standards require.[15] These regulations would confer authority on the states to classify these areas into one of three designated classes. Within these classified areas, the nondegradation requirement is to be implemented through the review of applications to construct or modify a group of designated stationary pollution sources. Initially, this review is to be conducted by EPA, but may be delegated by EPA to state or local agencies subject to EPA's approval.

The three area classifications provide different tolerance levels for additional pollution increments. Class I areas are those in which almost no change in present air quality levels is desired. In Class II areas a moderate change in pollution levels would be tolerated, but pollution controls more stringent than the national standards would be imposed. Class III areas are those in which major industrial or other growth is desired. Air quality in these areas would be allowed to deteriorate up to the national standards.

While Congress may yet act to eliminate the nondegradation requirement altogether, some may challenge the proposed regulations for failing to meet the requirements laid down by the court decisions. By allowing the air to deteriorate up to the national standards in Class III regions, EPA may have adopted an interpretation of the Act which was implicitly rejected by the Federal courts. Considerable leeway is also afforded the states, both in designating and in redesignating the classes into which areas are to be placed. Manipulation of class boundaries to allow additional growth in those areas in which the state wants growth to occur is a distinct possibility, and through this method the state may avoid the intended impact of the nondegradation requirements.

Parking Management Plan guidelines, newly proposed by EPA for cities with serious motor vehicle pollution problems, indicate some of EPA's current thinking on transportation strategies.[16] These guidelines impose stringent requirements on the location and operation of parking facilities, and supplant the indirect source regulations in those cities to which they are applicable. The guidelines may be implemented at the local level through a review of individual applications for parking facility construction. Approval may not be given unless it is demonstrated that the new facility is consistent with the need to minimize vehicle miles traveled in the area affected, and that the new facility will not cause or exacerbate a violation of the national carbon monoxide standards. In the alternative, localities may adopt a local Parking Management Plan which provides for controls over the development of new parking facilities in relationship to existing parking resources and the present and projected transportation system.

MAJOR POLICY ISSUES PRESENTED BY THE LAND USE AND TRANSPORTATION CONTROL REQUIREMENTS

EPA's multifaceted entry into the land use and transportation control field raises significant problems that must be resolved if these initiatives are to be effective. Unfortunately, the Agency's response has in part been a reaction to a series of individual court decisions, none of which was brought with the formulation of an overall and comprehensive agency strategy in mind. These court decisions have focused the Agency's attention on nondegradation and maintenance problems to the exclusion of land use control and other techniques that can be helpful in meeting air quality standards in those areas in which they have not yet been achieved.

The Agency response has thus been piecemeal, and the ad hoc nature of this response creates the most serious difficulties for the EPA land use and transportation program. To some extent, of course, EPA's land use and transportation initiatives are complementary and do not overlap. Areas subject to the nondegradation regulations, for example, do not fall under the air quality maintenance requirement, although presumably they might once national standards have been reached in the Class III areas. Nevertheless, EPA guidelines are in some measure incomplete and do not add up to a consistent approach to air quality problems.

These trade-offs in program priorities need more serious consideration than apparently they have been given so far. It can hardly be accepted in the long run that areas subject to the nondegradation requirement may be required to halt any further significant deterioration, while nearby areas that have not yet achieved the national standards must struggle with whatever means are available just to achieve the level of compliance that the standards require. Especially is this so since pollution sources diverted from the nondegradation areas may find their way into areas not yet meeting standards, thus making the job of compliance in these areas even more difficult than what it otherwise would be.

This comment suggests that the sum total of EPA initiatives for meeting land use and transportation objectives will have serious and significant impacts on growth priorities in urban and urbanizing areas. These impacts are likely to be felt through direct controls on major, growth-inducing developments, as EPA has chosen to implement most of its strategies through direct controls on major stationary sources of pollution. Controls over these sources, when executed in air quality programs, will thus preempt most local and even state land development control efforts because of the effect that the location of these sources will have on growth and urbanization patterns. Decisions about major highway locations, when combined with the stringent controls imposed on other major sources through indirect source review and nondegradation requirements, will set the framework for some time to come within which state and local land use controls must operate. Equally as stringent controls over major sources are contemplated in order to implement air quality maintenance planning. Controls over transportation are not as direct, but if construction of new parking facilities is severely limited because of EPA guidelines, then localities can only respond by strengthening their public transportation networks. This step, in turn, will have significant impacts on urbanization patterns, primarily because of the higher densities that public transportation systems require.

EPA's land use and transportation initiatives have thus injected a major stimulus for change in the legal framework needed to implement land use and transportation controls, but the measures needed to carry out these changes have been left unclear. As indicated above, the Clean Air Act contains no prescriptions on the re-arrangement of state and local responsibilities which will be necessary to make these land use and transportation controls effective. EPA guidelines increasingly speak to this problem, but with no statutory guidance on these sensitive issues, the Agency is left to fend for itself with no Federal statutory backup to legitimize its expectations. These problems are even more severe because of the equally massive demands on state and local decision-making that will be required through various implementation requirements that are contained in the Federal Water Pollution Control Act. EPA guidelines vainly attempt to encourage the coordination of these sometimes very different statutory purposes, but exhortation is not enough in the face of program inadequacies at state and local levels, the complexity of governmental institutions in the land use and transportation fields, and built-in governmental resistance to change. These obstacles will be very difficult to overcome without explicit Federal statutory guidance. This guidance may not be forthcoming. Congressional reluctance to mandate substantial changes in state and local land use controls through enactment of a National Land Use Policy Act testifies to the sensitive nature of these issues.

EPA thus stands at a crossroads in its implementation policies. The Agency can continue to mandate extensive state and local programs in the land use and transportation fields, clothing the major institutional changes that these programs necessarily must bring in ambiguity until Congress legislates a clearer path. As an alternative, EPA can fall back to a less aggressive stance on land use and transportation issues, providing air quality guidelines for major new developments that have more flexibility than those presently adopted. The issues to be resolved in deciding on major new developments can then be left to the conventional land use and transportation programs, subject to air quality criteria that bind in most cases, but that can be traded off against other values when land development objectives demand their modification. Possibilities for this approach exist in those states that have strong state land development control programs; in these states, program objectives can be coordinated between the state land development and air pollution control agencies. EPA regulations already point in this direction, and good opportunities for this type of coordination presently exist in the state coastal zone programs now authorized by the National Coastal Zone Management Act of 1972. State air quality agencies have a strong bargaining position under this legislation through the power of preemption that is accorded to the requirements of the pollution control programs. Even statutory priority for air quality objectives will not save the day, however, when these objectives collide with equally powerful public and private interests. No one agency, whether state or Federal, may for any length of time preempt significant decision-making powers over major public and private developments that influence the future shape of urban areas in this country. Chaos can only be avoided by finding some method for resolving the many conflicts in objective that are presented by conflicting Federal demands.

The route to this kind of accommodation probably lies more through executive direction at national and state levels than it does through specific statutory and regulatory commands. At the state level, a stronger role for the Governor's office, operating through state and regional agencies with the authority to resolve conflicting programs, appears as a reasonable possibility. Strong executive direction has not been typical of American government, and will require significant changes in governmental structures and powers if it is to be effective. But the challenge must be faced if the steps we have taken so far are not to lead, like the 39 Steps of cinema fame, into even murkier waters.

FOOTNOTES

[1] 42 U.S.C. §§ 1857-58a (1970).

[2] 42 U.S.C. § 1857c-f(a)(2)(B) (1970). For a discussion of the legislative history of this provision see D. R. Mandelker and S. B. Rothschild, "The Role of Land-Use Controls in Combating Air Pollution Under the Clean Air Act of 1970," 3 *Ecology Law Quarterly* 235 (1973).

[3] 42 U.S.C. § 1857c-5(a)(4) (1970).

[4] 42 U.S.C. § 1857c-5(e)(1)(B) (1970).

[5] For a description of EPA's transportation control program, see 38 Fed. Reg. 30626-30633 (1973).

[6] 40 C.F.R. § 51.12(a) (1974).

[7] 40 C.F.R. § 51.10(a) (1974).

[8] Natural Resources Defense Council v. EPA, 475 F.2d 968 (D.C. Cir. 1973).

[9] Natural Resources Defense Council v. EPA, 494 F.2d 519 (2nd Cir. 1974).

[10] Friends of the Earth v. EPA, 499 F.2d 1118 (2nd Cir. 1974).

[11] See Natural Resources Defense Council v. EPA, 480 F.2d 390 (5th Cir. 1974); D. Mandelker, *New Developments in Land and Environmental Controls* 178-79 Bobbs-Merrill, Inc., Indianapolis (1974) (Supplement to D. Mandelker, *Managing Our Urban Environment*, 2nd ed., 1971).

[12] Sierra Club v. Ruckelshaus, 344 F. Supp. 253 (D.D.C. 1972), aff'd mem., 4 E.R.C. 1815 (D.C. Cir. 1972), aff'd by equally divided court sub nom., Frie v. Sierra Club, 412 U.S. 541 (1973).

[13] 40 C.F.R. § 51.18(a) (1974).

[14] 40 C.F.R. § 52.22 (1974).

[15] Environmental Protection Agency. "Approval and Promulgation of Implementation Plans: Prevention of Significant Air Quality Deterioration," 39 Fed. Reg. 31000-31009 (1974) (proposed rule).

[16] 39 Fed. Reg. 30429 (1974) (proposed regulations).

Land Use: Current Policy and Planning Setting

Robert C. Einsweiler
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BRIEF HISTORY AND FRAME SETTING

What is land use? It is one of the latest Washington buzz words. At least four Federal agencies now have a land use office, bureau or unit—Interior, Agriculture, EPA, and HUD. Interior created a unit to handle a bill that never passed. Agriculture maintains it was the first Federal agency in land use and still runs the largest game in town. EPA is getting into the act fast as land use strategies grow ever more important in achieving pollution abatement objectives. HUD is now suggesting that a mandatory land use element in "701" funded plans would be a good idea.

All these agencies are not talking about the same thing. And much of it is not the land use to which zoning traditionally relates. It is this larger collective land use which the conference must address.

A second buzz word is management. There is development management, transportation management, management of health care services, planning and management, and more.

The buzz words suggest a changed point of view. But is it really new? Or have we merely rediscovered truths held long ago and later set aside?

To relate land use to air quality planning and management, I would like to set several propositions before you as a means of understanding where we have been, where we are, and where we might be going. Briefly stated, the propositions are as follows (with credit to Marion Clawson for the first two):

1. Until recently, development of land has been a cherished American value or ideology;
2. The scales have tipped in favor of public interests in land rather than the preeminent private interests of earlier years;
3. The restraint on private use of land through exercise of the police power has become so stringent in some cases that totally new development controls have been invented;

4. There have always been development management systems at the Federal, state and local levels; and
5. Land use planning has been in ascendancy in those periods when the work of the planners coincided with the purposes and objectives of the development management systems.

A quick review of Federal level history would reveal the following. In inducing private development, the government made land grants to railroads, to states for universities, to local governments for school sites, and to individuals for homesteads. The government induced and enabled land sales through Federal land surveys. Perhaps the greatest inducement to urbanization has been the combination of the Federal highway system, the FHA guaranteed mortgage, and the IRS capital gains treatment of profits from land conversion. The Federal government has developed cheap power, irrigated the desert, and subsidized most forms of transportation. Not to be ignored are the inducements in employment that derive from military installations, defense contracts, and other procurement. The list could go on. All support the first proposition stated above.

In addition to inducements, the Federal government has also enabled people to migrate by nationalizing a large portion of the welfare, unemployment, and retirement programs.

More recently, the unbridled support of development has lead to interstate land sales control, restraints on pollution, and restraint on development in the coastal zone.

While many would say there is no national growth policy or national planning, they are in error. There is a national growth policy. There is a national development management system. There is national planning. What is needed is change or improvement in the system and its management. We need codification and coordination of the disparate and sometimes conflicting elements.

Several points of interest derive from a Federal analysis. At one time most of the land was owned by the government. The private rights in property issue could have been handled differently. The approach to growth management was to use incentives. The use of restraints at the Federal level is a very recent phenomenon. The Federal development management system has generally embraced elements, techniques, or scales of operation that were totally separate from the activities of the local land use planners and zoners. There is a growing conflict in Federal programs between the state-local government emphasis of revenue sharing and the regional government emphasis of service delivery and pollution abatement programs.

The history at the metropolitan and local level is in sharp contrast to that described above. Development management came slowly. It was essentially regulatory or restraining in nature. It emerged from privately funded planning commissions. It had little in the way of teeth for implementation.

Touching just a few milestones in local planning, the first national conference on city planning was held in 1909. The American Institute of Planners was founded in 1917. In 1922 the U.S. Department of Commerce published the Standard State Zoning Enabling Act. In Euclid v. Ambler in 1926, zoning was established by a far-reaching decision.

In 1925 Theodora Kimball Hubbard reported 30 national organizations actively interested in problems of town and regional planning; planning active in 25 states, fairly active in 19 states, and absent in only 4 states; some planning activity in 350 cities including 57 of the 60 largest; about 300 planning and zoning commissions; 44 states having zoning enabling legislation; 320 zoned municipalities with a population of 27,000,000; regional planning in process in 12 metropolitan areas and in several countries; and 2 new towns in process. Six years later Harold Buttenheim reported: zoning authorized in all 48 states; 716 local planning commissions; 67 regional planning commissions or organizations; 30 county planning commissions and 920 zoning ordinances including 88 of the 99 cities having populations over 100,000.

The true commitment of local governments to land use planning came during the next few years. Virtually all local planning budgets were wiped out during the depression. Could it be that land use planning was out of touch with the pressing issues on the local government agenda? However, planning reappeared at the national level in the National Resources Planning Board and at the state level in its offspring, the state planning agencies. The orientation was more social and economic.

The scope of local planning and zoning at the turn of the century was concerned with public lands and investments. Later, sustained by Euclid, the regulation of private development was emerging. Until very recently, that control was of **use** by **location.** The **timing** of development was the prerogative of the property owner. The kit bag of controls usually employed contained zoning, subdivision regulations, official maps, and sometimes capital budgeting.

There is a further change in planning. The rational planning method—goals, policies, programs—is yielding in some locations to new guidance systems and other planning and management processes more compatible with the reality of Lindblom—like incremental decision-making.

RECENT MAJOR CHANGES IN LAND USE

The National Scene

The National Environmental Policy Act became law in January 1970. A year later, Bosselman and Callies described the movement that produced that Act and other changes as "the quiet revolution in land use control." Land was being viewed as a resource to be husbanded for future generations as well as a commodity to be bought and sold; further, that natural processes have value requiring protection.

One of the more stringent rulings in this regard is Just v. Marinette County in which the court said: "The changing of wetlands and swamps to the damage of the general public by upsetting the natural environment and natural relationship is not a reasonable use of that land which is protected from police power regulation." The court went on to say, "The shoreland zoning ordinance preserves nature, the environment, and natural resources as they were created and to which the people have a present right."

This environmental emphasis shows through the defeated National Land Use Policy Act. That bill was based on Article 7 of the American Law Institute **Model Land Development Code.** It contained the "critical areas" and "development of regional impact" elements of the code, now found in Florida law. The ALI Code would lodge such planning activity in a state planning agency located in the office of the governor.

Owing to its parentage in the Senate Interior and Insular Affairs Committee, the Land Use Policy Act would be administered through the Department of Interior and in many states through a state Department of Natural Resources. This structure is logical given the bill's beginnings. It is illogical given the type of trade-off between development and the environment envisioned by the Act. Perhaps the greatest weakness is the parallel administration of the bill at the national level in a single agency rather than in a White House office, given the current crop of four agencies with land use units. And the number is likely to rise.

What is the future of the Act? Reliable sources say the President together with the Secretary of the Interior will prepare a new proposal for land use legislation to be unveiled about the end of January. It is believed that Senators Jackson and Udall will reintroduce the legislation, but hold a series of field hearings to insure direct discussion at the grass roots on items misinterpreted by the Liberty Lobby and others this past session.

There are several other acts that are appropriately considered land use bills. These include the Coastal Zone Management Act of 1972, the National Flood Insurance program of HUD, and Senator Muskie's three major pollution abatement bills—the Clean Air Act, the Water Pollution Control Act, and Solid Waste Management. It is rumored that Muskie may suggest directly, as he did before, that these latter three bills be treated as land use bills. Further, amendments to the Solid Waste Act may be prepared to make it more compatible with the other two and to build in a regional component.

The National Land Use Policy Act and the Coastal Zone Management Act both require state planning and management processes to achieve the Acts' objectives by those states wishing to participate. State land use planning under the National Land Use Policy Act would not be mandatory. The Federal approval is to be on process, not content. The pollution acts, in addition, mandate Federal standards to be met by the states in subsequent regulations and plans.

These Acts do not directly envision the Federal government stepping into the land use field, a field generally held to be constitutionally reserved to the states. However, the Acts do envision more active state roles in land use, the Federal agency identification of land use strategies to be executed by others as means to achieve legislative objectives.

The pollution control acts have a strong regional emphasis. This is appropriate as both the locus of major problems and of sanitary districts and similar service agencies needed to build solutions to the problems. The weakness is that there is no direct land use control at the regional level.

The State Scene

All across the nation, the states are reviewing the need to take back a portion of the land use authority delegated to the local governments. The exception is Hawaii which did not make the traditional delegations when it achieved statehood.

There is a growing need to distinguish between environmental and economic or development considerations. The useage is inconsistent and murky. Three related terms are used differently among the states—land use, land capability, and settlement policy. Land use may have any of the meanings ascribed to it by urban planners, people in agriculture, or resource management professionals. It may refer to urban activities, production lands, or natural resource areas. Land capability is a means of describing the tolerance for development of a given area or parcel. The capability may vary, however, depending on the degree of care or level of investment to protect the land from adverse impacts of the development. What the land **should** be used for is a separate topic, settlement policy. It varies in meaning to include future policy on location of development and sometimes on rate of growth as well. The greatest confusion in discussing "land use" stems from this wide range of unstated definitions of the term.

The most difficult issue for any level of government is to say where people may or may not live. A recent study ranked several means of controlling land use to prevent overtaxing water resources. Included were control of: (1) numerical magnitude of growth, (2) location or spatial distribution, (3) intensity of use, and (4) detailed site design of individual development projects. Several interesting conclusions emerged. First, the effectiveness of balancing land use and water resource decreased from (1) to (4). Second, it appears that cost of administering controls increases from (1) to (4). This suggests a perfect fit—the most effective tool is the cheapest, the least effective is the most expensive. However, recent court rulings on right to travel combined with earlier interpretations on exclusionary practices foreclose precise control of numerical growth at the local level, the prime locus of land use control. The strongest authority exists for controls of intensity and detailed site design, the most expensive controls to administer. Why should this be so? Because the interference with property rights is greatest with (1) and least with (4). That explains, in part, why state settlement policy and national land use policy are politically and legally vexing.

Only Hawaii to this point has established clear settlement policy in its four-part state land use system which allocates land to urban, rural, agriculture, and conservation. For many other states, the task is more taxing for three reasons. The landscape is more varied or fine grained and therefore does not divide into such large land units when classifications are applied. Other states do not have the very large scale, single-owner agricultural holdings found in Hawaii. Most importantly, land use has been delegated to local government in other states and must be retrieved or made subject to override.

As a move toward settlement policy, a number of states created commissions on the future. By examining alternate scenarios for growth and settlement, some of the issues hopefully can be drawn into the open.

Much of the land use activity at the state level is really not settlement but environmental, a topic on which there is broader consensus. These programs, in limited instances, are comprehensive in scope, as in Hawaii and Vermont. More often they are geographically selective, as in Florida's critical areas and development of regional impact. Some of the approaches are functionally selective—wetlands, shorelands, floodplains, or power plant siting such as found in Wisconsin and Minnesota. Finally, some states have moved to create super environmental departments by combining natural resource, pollution control, and perhaps new land use authority. Some are saying there will be no more comprehensive land use laws like Vermont; the remaining states are too knowledgeable about the potential impacts of such legislation. Incrementalism may be the more workable strategy. Minnesota passed 43 environmental bills, many with land use implications, in one legislative session.

Air pollution abatement programs offset and are affected by patterns of urban settlement. With the exception of one or two states, this is now being approached in a partial and negative way by stating where people may **not** live. The other side of the coin, the positive plan for settlement, is coming slowly. Even Vermont found wide support for its land capability plan and limited support for the land use plan showing where development should and should not go.

The No-Growth Scene

In a recent examination of no growth, slow growth schemes around the country, several motivations for action consistently occurred. The most frequent concern was with the provision or cost of services. Rapid growth had driven up prices or caused an unacceptable lag in service delivery. The second reason was environmental damage followed closely by a related desire to preserve a way of life or quality of life.

Virtually all of the areas house people of higher income and education who can fight effectively for their beliefs. The development management systems were the product of enlightened government in some cases and of rebellious citizens in others. The systems employ a variety of means to limit growth—numerical limits, geographic limits, governmental capacity or market stress. The numerical limit approach in Boca Raton and Petaluma is being challenged. Petaluma lost in the lower court and is appealing. Boca Raton is in court. The more recent systems are avoiding this approach. The legal challenge has been based on the right to travel. The geographic limit schemes of Sacremento, Salem, and Prince Georges County, Maryland, are yielding or evolving into urban service areas rather than arbitrary lines.

The governmental capacity approach ties private development to public investments. Ramapo and Prince Georges are cases in point. These schemes seem the most sustainable provided the level of public investment is reasonable and that there is no attempt to be exclusionary. In the latter regard, a regional program to allocate uses subject to discrimination—low income housing, noxious industry—would support the non-exclusionary argument. Perhaps pollution "rights" should be added.

The market stress approach is used by Loudoun County, Virginia. In that system, the government plans for low density growth around existing growth centers. If a developer wishes to rezone and raise densities, he may be allowed to do so provided the project is consistent with the plan and the developer pays the difference in cost of public services between what is planned by the government and what is proposed by the developer. While this was challenged earlier, the developer withdrew an appeal. It is likely he could not afford further delay.

In reviewing the systems put together by these agencies, most were found to have integrated a selected number of traditional controls into a system whereby public investments set the rules for the **timing** and **location** of private activity. In all, like Heinz, 57 varieties of control elements were identified. These spanned the range of direct public ownership and development, regulation, incentives, and information and advice. Many of the items on the list—taxes, pollution controls, fees and charges—are usually justified on other grounds, but do have a development impact. Boca Raton was the only community to directly address the problem of residuals as a restraint on growth. Unfortunately the research was not well done.

Ramapo, in setting up its system, moved a step further toward the British concept of development permission or the separation of the rights of ownership from the right to develop. Newer techniques, such as transfer of development rights, carry this one step further. In so doing, they enter the same arena of allocative or distributive analysis now being considered for air pollution "rights."

One key aspect of these systems, particularly in the Fairfax proposal, is that they envision some central management by which the various activities of government impacting development will be coordinated. Pollution controls will continue to be used to abate pollution, but also will be expected to contribute positively to development objectives. The same holds for taxes, fees, and other elements of the system.

The Growing Concern for Implementation of Plans

I have not found such a concern. Rather I find that the concerns of the public require action of planners. In certain instances plans are a necessary mechanism. The concern with action has always been there. As that concern focuses on land use and development management to achieve objectives, traditionally planning begins to move back into the stream of public decisionmaking. The people have not changed; planning, unfortunately, has not changed; the agenda has changed and now brings the two together.

Recent Federal legislation on air pollution, water pollution, and transportation is moving regional agencies into implementation. But it is implementation related to service systems and not land use. The problem is that these two—land use and service systems—interact, but they are being separated by government level.

SPECIFIC IMPLICATIONS FOR AIR QUALITY MANAGEMENT

The main implications are as follows:

1. To be effective, air quality management will have to develop a preventive strategy as part of state and local development management functions. To pursue the course of exercising land use authority for the single purpose of air pollution prevention is foolhardy. There are substantial trade-offs to be made. This must be done in a setting where the factors can gain equal hearing or be equally weighed.

   It is argued that pollution standards should not be subject to trade-off or compromise because they are based on health. This argument misses the mark in two ways. Most importantly, the political decision-making system is by its very nature a system for trade-offs or balancing of interests. Any proposal that fails to recognize that fact is doomed to failure. Secondly, the standard related to health is not an absolute threshhold with one side being health and the other non-health. The issue is the degree of health impairment. State and local governments have been making choices on this issue for generations in setting speed limits, rates of curvature of roadways, sanitation ordinances, water treatment budgets and more.

   While the proposed air pollution implementation strategies may be deemed by professionals to be the only reasonable means to achieve standards, politicians may not agree. Further, the specific strategies, as a universal nationwide solution, may be inappropriate to variations in state and local development policies. Central city auto access and parking may be logical and right. It may be the internal combustion engine that is wrong. If so, the strategy should be incentives for Detroit auto manufacturers rather than restraints on parking in central business districts.

   Unless the implementation strategies are integrated with rational state and local development programs, and designed to operate in a political trade-off system, they will continue to be challenged in congressional legislation as the parking strategies are now.

2. The non-degradation issue ties directly to state settlement strategies. The need for resolution of location of areas to receive further growth under the "significant deterioration"

limit may well prove to be the needed catalyst for state action on settlement policy.

3. At the regional level, a process must be worked out to put together state and local land use control with the emerging regional service system control and pollution abatement authority.
4. The new local development management systems offer more capable control of development for pollution abatement, pollution prevention, or other purposes.
5. The newer development control techniques, such as transfer of development rights, face the same issues as proposed in such air quality maintenance strategies as emission allocation procedures or emission density zoning. Legal and administrative solutions to one should apply to the other.
6. Limits on development for air quality purposes are likely to be challenged on the same legal grounds of exclusion and right to travel faced by the no-growth systems. Remedies on a regional basis may be equally appropriate in each case.
7. It would be appropriate to investigate incentive systems in lieu of regulatory actions. Incentives would enable the market to work better. Such an approach would be a return to a long national tradition. It also would be appropriate to focus more actively on tax and fee systems rather than administrative regulations. Administrative costs should be reduced substantially, and, again, the market should work better.
8. Last, but not least, there is need for programs and strategies that **enable** state and local officials to make environmentally responsible decisions rather than **force** them. There is a need to accept the fact that all are concerned about this planet, but that we all make decisions restrained by different sets of rules. It may be far more effective to work to remove the impediment to "right" decisions than to establish enforcement rules to prevent "wrong" ones. The fiscal disparities legislation in the Twin Cities is a case in point. It enables the local officials to evaluate the true need for development and removes the distortion of the chase for tax base.

Transportation Policy and Air Quality Management: Some Current Perspectives

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The Clean Air Act of 1970 represents a legislative commitment at the Federal level to achieving significant, positive changes in the quality of one aspect of our environment. It is one component of a policy response to the problem of degradation of air quality, a problem which is generally recognized as important—and, at least apparently, soluble—by many sectors of American society. It is not clear, however, that all of the requisite components of an effective policy and technological response to this problem are currently in our hands today.

From the perspective of transportation, the nature of an effective response to the problem of maintaining and improving air quality, particularly in urban areas where the severity of the problem is at its highest level, is both highly critical and highly uncertain. In part, this is due to the major contribution which transportation makes to air pollution: roughly 60 percent of the hydrocarbons, 90 percent of the CO, and 46 percent of the oxides of nitrogen in our atmosphere are traceable to transportation sources. While approaches to solving this complex problem are simplified in certain respects because we can focus on relatively well-defined sources, we must recognize that achieving significant changes in air quality through the inducement of massive changes in transportation cannot avoid producing large-scale, widespread impacts on urban America. The nature of these impacts can be expected to be a source of constraints on our ability to achieve air quality improvements, either in terms of restricting the development of policy or in terms of limiting the nature of policies and programs that will actually be implementable.

We must recognize that legislation represents only one dimension of a total policy/technology response to the problem. Past experience in the field of transportation suggests that the legislative basis for action is a fundamental requisite for the achievement of large-scale social and technological change. At the same time, it is also apparent that the legislative intent can easily be subverted if a number of other requisites are not met for supporting the implementation of large-scale changes. In particular, the translation of legislative action into social change has been most clearly limited in the past when the nature of the impact trade-offs involved in the proposed change are not recognized and understood in the development and implementation of the legislation itself.

Perhaps there is no easier way to begin to understand the dimensions of the problem at hand than to examine the transportation control strategies proposed for meeting air quality implementation requirements in the nearly 40 urban areas which recently faced the Federally-established mandate to respond to their own critical air quality problems. A review of these implementation plans shows that three classes of strategies are typically considered: reductions in vehicle emissions through such mechanisms as technological change, improved maintenance standards, and vehicle inspections; improvements in traffic flow characteristics; and reduction in the vehicle miles of travel in the urban areas. The first class of strategies can make—and is making—significant contributions to relieving the problem at hand. Traffic-flow improvements can also have great promise, and tend to be welcomed even by trip-makers who care little about air quality. It is apparent, however, that what sets these problem regions apart from the rest of the nation is the need to reduce vehicle miles of travel in order to meet ambient air quality standards.

Achievement of significant reductions in VMT—20 percent, for example, as suggested in the Los Angeles Basin—carries with it some critical implications for the future quality of urban life. Such reductions might be achieved through two approaches: elimination of some of the demand for travel, and the shifting of large amounts of auto travel to more efficient modes. To eliminate some of the need for travel, we can either accept significant degradation of our standard of living—a clearly unpopular option—or we can find ways in which to achieve our needs to work, shop, learn, and recreate which will require less travel. The substitution of communications for transportation offers one potentially useful approach to this, but one which is obviously long-term in nature. This strategy carries with it a great deal of uncertainty as well, because limited analyses of past trends suggest that when communications technologies are improved, the demand for travel goes up. Still, this approach carries with it enough promise to cause some concern for the low level of effort being applied to understanding and evaluating it.

A more promising, but still long-term approach to reducing the demand for travel is to restructure urban land use. Simulation studies have shown that the clustering of land uses—particularly employment—can achieve reductions in travel on the order of 25 percent or more, with concomitant reductions in air pollution and energy consumption. These reductions promise to be larger than those obtainable through limitations in the use of the auto. Yet, historically we have approached land use development in the United States through free-market processes, with some application of directed investments in urban infrastructure to guide spatial trends. This leaves us with a weak set of control strategies producing impacts which have a high degree of uncertainty, and which require long time periods to obtain. On this note, it is interesting to observe that many of the critical region implementation plans discuss the merits of land use control, but none seem to adopt this approach to solving the air quality problem. This is perhaps the most realistic component of such plans.

The preferred strategy, as reflected in the implementation plans, is to bring about modal shifts, primarily from the low-level-of-occupancy automobile to various forms of public transit, as well as to carpooling, which for all practical purposes is a different mode from one driver in one car. This attempt to achieve relatively large-scale shifts in mode of travel is being approached with both the carrot and the stick. We have begun to learn that improvements in transit services alone can divert some travelers to that mode, but the primary benefit falls to existing transit users. Reductions in the level of service to auto users, at least in the short term, brings about congestion, multi-mile queues, and increases in air pollution and energy consumption. The auto typically offers significant travel advantages to many urban trip-makers; and, unless effective competitive service is provided, those travelers will not leave their cars. The best example of a combined strategy is the Shirley Highway Corridor in Washington, where greatly improved express transit service was implemented at the same time that the capacity of auto facilities was reduced; as a result, 40 percent of the peak-period travelers in that corridor are using transit in one of the most auto-oriented cities in the country. Yet this project has clearly been an experiment, and the degree to which we can extrapolate from its results is limited.

Transit improvement strategies being considered in the implementation plans focus primarily on perturbation of existing bus operations, although some promise is held in the long term for new fixed-guideway rapid transit. Short-term changes considered include expanded bus service, express service, express services on exclusive lanes, improved connectivity of existing transit services, provision of fringe parking, and price reductions. Auto disincentives considered include reduced parking availability in CBD's, increased parking prices, auto-free zones and streets which reduce capacity, vehicle use and fuel taxes, and, in the extreme, gasoline rationing.

What are the ramifications of such changes? Perhaps the principal need for concern derives from the simple fact that no one really knows. In the narrowest sense, we cannot develop a definitive information base for deciding, with a reasonable level of confidence, what effect any one of these component strategies will have on urban travel and the desired modal shift. More broadly, the techniques of demand analysis which are available, and the smaller set which has been applied in the development of implementation plans, do not permit us to understand the travel behavior implications of collections of strategies applied together. We have relied on partial equilibrium approaches to determining the aggregate effects of groups of control methods, all the while stating that, of course, we cannot really add up the expected individual effects.

Perhaps most important, we have not yet faced the more serious, long-term problem: what will these proposed changes in the allocation of transportation services within a region, in terms of service levels and price by mode and area, do to accessibility, mobility, land values, land use, and the quality of urban life? While the specific answers to these questions for a particular area are not known and may not be knowable, it seems relatively likely that these control strategies threaten—or promise—to bring about major shifts in the social and economic balance of power. If this is the case, legislation alone will not solve the problem.

Instead, what we are facing is an apparent need to change to goals of transportation planning. A number of forces must fall into line if such a change is to come about. Whether or not we can bring these forces to bear is probably dependent in large part on whether a shift in the socioeconomic balance of power is likely because of them, and whether that shift is acceptable to our society.

It is relatively clear that transportation planning, especially in urban areas, has tended to be a collection of activities which extrapolate the present into the future, giving us a city tomorrow which is very much like the city of today—only bigger and, some say, better. We have relied strongly on projection approaches, both in terms of planning methods and in terms of resource allocation. This means that we have observed what people are doing today, and have used that observation as the basis for deciding what people need tomorrow.

The implications of the Clean Air Act of 1970, as well as the 1969 NEPA, are that we must plan to the tune of different goals. We must establish some specifications of the desired quality of urban life, and we must find ways in which to meet those specifications. While it has been shown that it is not impossible to achieve such significant goal shifts at the Federal level, at least in terms of legislative policy, it is still not clear that we can implement such shifts at the local level.

The impacts of such changes at the local level cannot be overlooked, although it makes the job easier if we do so. But for two obvious reasons, the local implications may have the overriding influence on our ability to respond to the new concerns of a quality environment. First, success in this field of endeavor requires that policies and programs be implemented locally, in the regions where the air quality problem is most severe. Second, the impacts of such changes, both positive and negative, will be felt primarily at the local level. It seems unlikely that such programs, including shifts in goals, modes of travel, and the local balance of power, will be achievable if they are not generally accepted at the local level.

What can Federal transportation policies do to accomplish the kinds of shifts necessary? Let us consider this question in terms of four key requisites which we propose as necessary for achieving major shifts in transportation system development patterns and modal usage at the local level. These requisites are funding, technological and non-technological options, planning process and methods, and the achievement of local commitment to action. Beyond legal requirements, which others are more qualified to discuss, these components are necessary to change the development trajectory of urban transportation systems. Indeed, one might argue that legislation will not be effective until these requisites fall into line. We will also argue that, in terms of the first three requisites, the Federal role has been of historic significance, and thus can be expected to be important in the future.

Historically, the level of **Federal funding** for auto-oriented transportation has been generally increasing for 60 years, but not until the establishment of the Interstate Highway System did this produce a massive effect in urban areas. Investments in farm-to-market roads did, of course, serve to encourage the spatial growth of cities, but the availability of 90 percent Federal funding for Interstate freeways in our cities has strongly reinforced a general trend toward auto-dependent urban travel.

We have, perhaps, been slow to recognize the over-riding influence of the availability of Federal dollars for particular types of programs on the investment patterns of local governments. Federal resources directed toward highways alone until the 1960's has left the urban regions with too few pleasant options with regard to the development of their transportation systems. The impact of the decision to carry the Interstate System into developed urban areas has been especially significant, for it has told the cities that $10 worth of construction employment could be had for the mere investment of $1 in local monies, thus making their transportation choices clear.

This implies, of course, that urban freeway investments were otherwise irrational, which was not the case. Growth in auto ownership, declining interest on the part of trip-makers in transit, and increasing congestion, all suggested that improved highways were necessary for the survival of our cities. What we have failed to appreciate until recently is that using this extrapolative approach committed us to a particular kind of urban future, one which has some very unattractive characteristics in terms of utilization of air, land, and energy resources.

But we have gone about as far as we can go with urban freeways. The Highway Act of 1973 reflects a commitment to complete the Interstate System within a finite time period. More importantly, most larger cities have found that implementation of additional urban freeways has become difficult, if not impossible, because of citizen opposition based on social and environmental impacts.

Transit funding from general Federal revenues has been increasing for the past ten years. Virtually all of these monies have been oriented toward capital grants, none toward the major transit cost center—operating costs. The Highway Act of 1973, however, puts the funding situation in a slightly different light, especially in terms of air quality management, for it gives local governments the option, for the first time, of allocating Federal matching dollars intended for highways to transit investments. This requires that cities forego highway investments equal in cost to the preferred transit projects, and the transit monies were to be funded from general revenues. The amount of Federal resources available on a 70/30 matching basis in FY'74 was $780 million. In FY'75 this increased to $800 million, with up to $200 million in bus-related investments supportable from the Federal Highway Trust Fund. In FY'76, the entire $800 million urban fund can go into any form of transit, and it will come from the Trust Fund.

We cannot overlook the importance of where the Federal monies come from. First, this represents a successful assault on a sacred source of money, the Trust Fund. More importantly, the Trust Fund is a reliable, on-going source of funding, whereas the competition for general revenue funds is broader, and thus more difficult to overcome. It is interesting to note, however, that few cities have chosen to divert much money from highway to transit investments since the passage of this Act, despite the obvious pressures coming from the Clean Air Act of 1970 and other sources to change the nature of urban transportation. Furthermore, it is relatively apparent that these resources are nowhere nearly adequate for achieving massive improvements in urban transit over the next few years. Total Trust Fund authorizations over the same three-year period amount to over $16 billion, while urban-oriented Trust Fund monies are approximately $3.4 billion. Still, we must recognize the merit in this carrot-and-stick funding policy: monies can be shifted between urban modes, within limits, and thus there may be a potential for shifting travelers similarily, if the right investments are made.

We should also note that the 1973 Highway Act permits an urbanized area to give up a committed Interstate freeway segment in favor of an equal amount of Federal resources for a transit substitute in the corridor, as long as the Secretary of Transportation finds that Interstate link to be non-essential to the completion of the national network.

An increased amount of money—$6.1 billion—was made available under the Urban Mass Transportation Act of 1964. This is an appropriation for an indefinite time period, which comes from general revenues, now available on an 80/20 matching basis. Thus, significant transit funds are becoming available, but it is too early to assess the ways in which they are being used. The lack of operating subsidies is apparently a serious constraint, for cities are wary of investing in a system which they cannot afford to operate. Of course, reducing highway investments appropriately may serve to increase transit ridership, and hence the viability of such systems.

There is also a tendency to commit such transit resources to keeping existing services alive, when concerns regarding air quality improvement might lead to different kinds of transit investments. Furthermore, large amounts of Federal transit dollars are being sought for capital investments in fixed guideway systems in a few large cities where the merits of such investments in terms of the desire to change overall transportation-planning goals are not altogether clear, and where the impacts will be long term at best.

Finally, it is not apparent that Federal urban transport funds are being allocated in such a way as to help cities meet Clean Air standards. Monies are available, and the requirements exist, but there seems to be no strong effort in the Department of Transportation to insure that local investments are made to meet the Federally-established goal. This absence of strong direction in the allocation of resources puts the burden of commitment and decision upon the state and local governments, suggesting a need for us to be concerned about ways to insure that such a commitment obtains.

This situation is perhaps best illustrated by looking not at Clean Air Implementation Plans, but at typical regional transportation plans being developed in large urban areas. The very latest of these seem to give no more than lip service—if that—to the Clean Air requirements, and instead set about to promote the implementation of regional transportation plans developed under the goals of an earlier era. In some cases it appears that the regional and local-level agencies dealing with air quality plans in the transportation sector are totally separate from those concerned with long-range transportation planning. If the long-range planning agencies are successful, we may find ourselves in a clearly unacceptable situation with regard to air quality in the next decade.

The availability of **effective options** for achieving significant shifts in urban travel and transportation systems is the second key requisite. Effective options are those which achieve the desired shifts and which do not threaten the social, economic, or political viability of the region and its parts. This is a public policy issue because the design, development, implementation, and evaluation of such options has largely been undertaken with public resources in the past.

There seem to be two principal issues about which we need to be concerned. First, are such options truly available? Will it be possible to achieve the required modal shifts without producing serious degradations in accessibility and mobility and, consequently, without seriously affecting the regional balance of power? The answer to this question does not seem to be clear. In fact, it seems likely that the approaches to reductions in vehicle miles of travel suggested in many of the Implementation Plans will reduce accessibility to central cities, strengthening the development of suburban activity centers, and reducing the return on both public and private investments in the central areas.

Can Los Angeles survive in anything like its present form under a severe gasoline rationing plan? Can and will New York City slow the trend toward intensification of development in Manhattan? Will the political and economic interests in Boston accept a road-pricing scheme? And if the answers to these questions are all negative, which they may well be, is there any hope of implementing such policies? Finally, and from a more realistic point of view, are there alternative options which will move us toward our air quality goals without such negative impacts in other dimensions?

Transportation planners and policy-makers seem to have come to the realization that the key to the effectiveness of the planning process is implementation, without which our product is a report and nothing more. Implementation depends very heavily on the nature of the impacts of alternatives, their magnitude, directions, and incidence. We seem to know too little in these areas to design and implement desirable policies and plans.

Beyond the mere availability of viable options is a second issue: can we provide local decision-makers with sufficient confidence in their expectations regarding the impacts of particular options to make a choice possible? While this is one of the responsibilities of the planning process, we cannot easily separate it from our concern for options alone. This is because part of our responsibility in the development of options is the anticipation of their expected impacts with the highest possible level of confidence.

We suggest that these are research questions which must be studied and answered through studies in the laboratory and through large-scale experimentation in the field, with Federal sponsorship so that the risks of failure are shared by all who might benefit. The trend toward such research does not appear to be sufficiently strong today. Perhaps too much concern has been focused on both long- and short-term hardware-technology problems, without enough emphasis on policy research and studies of rule-changing options and new social technologies. While the latter do not have the glamour associated with the former, their potential contributions to relaxing the air, land, and energy resource constraints associated with providing urban accessibility may be very great.

A third requisite for approaching the transportation components of the urban air quality problem is the availability of a **responsive planning process and component methodolgies.** To plan urban transportation systems under a shifted goal set, to depart from the extrapolative, projection-oriented approaches to planning toward a strategy which is more directly concerned with environmental quality and resource constraints, we need a different planning process.

It should be apparent to anyone who has observed the urban transportation planning process over the past decade or more that the process itself can respond to changing goals, although that response is slow to come about. We still see regional transportation-planning agencies using a process oriented toward extrapolation of needs and the design of large-scale highway networks focused on the central city. We still see a very strong tendency to ignore public transportation, and to overlook local-scale impacts and operating characteristics which can be of fundamental importance in terms of local impacts. It is not apparent that more than a few transportation-planning agencies have responded effectively to the mandate for increased environmental sensitivity established in the 1969 NEPA: Environmental Impact Statements still tend to be viewed as hurdles to be leaped, rather than as opportunities to construct a new, more responsive approach to planning. The requirements for participatory planning established in the 1972 Highway Act and in FHWA Policy Procedure Memorandum 90-4 have not yet had a chance to truly influence the nature of the planning process.

The Federal responsibility for directing changes in the planning process is very heavy, if only because the current process evolved out of a history of previous Federal directives and policies. Unfortunately, the current trends do not promise a major Federal contribution in this area. First, there has been a strong tendency to lay one procedural requirement upon another. The 1968 Highway Act required two public hearings to get Federal construction financing; the 1962 Act required coordinated, comprehensive, and continuing planning; the Urban Mass Transportation Administration requires a Transit Development Program before monies will be allocated; the 1972 Highway Act requires a Federally **certified**, participative planning process meeting certain guidelines but designed by the state; the 1969 NEPA requires an Environmental Impact Statement; and finally, the Clean Air Act requires an implementation program.

It is not unusual for local and state agencies to find such overlapping requirements for transportation planning confusing, and to respond to the confusion by applying the traditional planning process which has been patched together in a piecemeal fashion to meet one requirement at a time. Perhaps this is why Clean Air Implementation Plans seems to diverge from regional transportation plans.

It is relevant to point out that a review of a selection of the transportation control plans prepared as a part of implementation planning in areas with serious air quality problems suggests that the processes used seem relatively consistent in their methodological weaknesses, their unresponsiveness to established transportation-planning procedures and requirements, and their failure to treat serious, long-term implications with even reasonable depth.

The certification concept now used by the Department of Transportation leads in the direction of local design, implementation, and control of the planning process, with only loose Federal oversight when compared with the previous approach. This may tend to reduce the Federal leverage for implementing a goal shift at the local level, resulting in an increased dependence upon local commitment to those goals. This must appear to be in conflict with the multi-layered requirements placed on local planning by Federal legislation and regulations.

Thus, there appears to be a need for a change in the planning process and, to accomplish this, a rationalization and coordination of Federal policies and procedures with respect to local transportation planning. It seems that this is the appropriate level at which to bring some of our environmental quality policies to bear on transportation development.

It is also relevant to note, at least in passing, that a component of the planning process requisite is a requirement for predictive models which can be applied to the assessment of alternative transportation control strategies. The required models are those appropriately sensitive to the key dimensions of the transportation options which will increase the confidence of decision-makers regarding the certainty of the expected impacts to a level high enough to permit a choice to be made. This is a particularly critical choice, since many of the options we are now considering involve limiting, rather than expanding, available transportation services. Such responsive models are not available to assess the travel behavior impacts of the strategies considered in many of the Implementation Plans, particularly those concerned with disincentives to the use of the automobile. In addition, the capability of existing models to treat the overlapping effects of collections of such strategies, including auto disincentives and transit incentives, is quite limited.

The Transportation Research Board Conference on Travel Demand Forecasting held at the end of 1972 documented many of these needs, and Federal research funds to meet them have been increased. Still, it is not clear that current funds will do the job. There is need for allocations of resources specifically to the problems highlighted in the Implementation Plans, as well as for the development of a longer-term field-experimentation program to gather empirical data necessary to develop such models.

Commitment at the local level, where plans must be implemented, and where the primary impacts will be felt, is the final requisite for effectively guiding transportation systems in the direction required for air quality management. Local commitment is not a Federal policy element, but it seems to arise out of an appropriate matching of funding policies, available options, and planning processes and components with local problem perceptions. In the past, Federal policies regarding urban freeway development were effective because the resources, options, and planning strategies were on hand, and they matched very closely with locally-perceived travel needs. This is not to say that freeways represented the optimal urban transport investments, but rather that, at the time they were constructed, their apparent costs were less than their apparent benefits.

It is not clear that we are near this point with current air quality management policies in the field of transportation. The potential local impacts of the most frequently considered strategies to achieve modal shifts may be clearly unacceptable to local governments. Furthermore, it is not apparent, based on the results of available predictive models, that such strategies will even achieve the travel behavior responses desired.

It is not clear that current Federal funding for urban transportation is available in sufficient magnitude, and within appropriate modal categories, to implement the strategies being considered today. More importantly, we must expect that **implementable** solutions will be even more expensive than those being considered today, if they are designed to ameliorate or compensate for negative effects on urban accessibility and mobility.

Today, we are beginning to understand the long-term local implications of a piece of Federal legislative policy. Many of the reactions are unfavorable, and it appears that the requisites for implementing that policy may not yet exist. But we can view this as a normal part of our policy-formulation process, wherein a policy is considered and adopted, we develop an understanding of its implications, and we adapt it to establish an appropriate balance of benefits and costs.

Adaptation of planning processes and rationalization of Federal funding patterns, planning requirements, and standards will

serve to enhance the chances for local commitment to achieving air quality standards through transportation changes. Without this local commitment, it is likely that the Federal pressures for change will be relaxed through the normal operations of the policy-formulation process. With a reasonable level of local commitment, the necessary changes in urban transportation may begin to occur, so that urban air quality improvements will be achieved.

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Session II

Planning and Air Quality Maintenance At The Urban-Metropolitan Scale

Chairman:

Maynard M. Hufschmidt, University of North Carolina
at Chapel Hill

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An Experience In Relating Transportation, Land Use, and Air Quality Planning

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TRENDS IN LAND USE AND TRANSPORTATION PLANNING

When charting the trends of regional land use and transportation planning as a prelude to considering their relationship to air quality, one is struck with the fact that integration has yet really to be achieved. To a considerable degree the problem still comes from the inability to find the institutional mechanism to resolve the issues and communication system on the one hand, and a technical gap in terms of relating the planning processes on the other. The solution to the institutional problem has been evolving over the past two decades and has made great strides in terms of the technicians working much more closely together in the overall planning process. However, there is still an unevenness in how the decision-making process operates and in where the authority or clout to do the job is centered. Too often regional land use power is still only alluded to through some voluntary association and the real clout through zoning, subdivision control, and redevelopment is left still at the local level. Yet there is very little indication that a regional land use plan really represents the consensus of the local participants and is being implemented in concert by them. For this reason, the regional land use policies that must fit into the transportation planning process are usually too general and vague.

This brings me to the second point—the technical gap. As stated earlier, there has been considerable progress made at the technical level in developing and undertaking a working relationship in land use and transportation planning. However, the technical gap still persists in the efforts of these craftsmen to portray their results as a basis for the decision-makers to act. The transportation planning technician using modeling as an evaluative tool needs input from the regional land use plans in the form of

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quantified information. This includes population, employment, unit densities, units of developable land, units of land unsuitable for development, or those suitable for open space. Too often the land use planner is in no position to make the hard call quantification—not that he cannot do it. Increasingly he is becoming better equipped to provide the data if he can be sure that the data truly represent the consensus of local planning viewpoints. This area is where the gap really prevails. It used to be that the gap was much greater between the "handicraft" land use planner and his "blob" plans and the transportation planner and his "systems" plans than is now the case. The land use planner has attained the ability to quantify but has a difficult task in being sure that it represents the attainable or desired planning posture of the region's constituency.

The institutional and technical gaps referred to also reflect a part of the problem which historically includes the political and credibility gap. While land use planning has been handicapped with its problems of attaining local consensus by a voluntary association of those governments involved, the transportation planner has often been given a role somewhat closer to the implementation structure; for instance, in the San Francisco Bay Area, the Metropolitan Transportation Commission (MTC) has veto powers if it can properly find the way to use them. Later on there will be some discussion as to how in the Bay Area an attempt is being made to resolve some of the issues of conflicting and overlapping jurisdictions.

The broad overview prior to introducing air quality, then, is that in twenty years or so land use and transportation planning have come a long way, but still have some way to go before a united front is presented in a real "standing the heat in the kitchen" way. How to put the land use and transportation planning issues before "regional" decision-makers is still a real problem.

Historically, it is probably fair to say that air quality considerations up to now have been more or less incidental to the regional land use-transportation planning process—not a real factor. There are a number of explanations for this that relate back to the institutional, technical, and political gaps. However, one of the biggest gaps that exists is the difference again in mission. The air quality management body is more often than not primarily a regulatory body. Its mission revolves around a set of procedures for processing specific permits. Contrast this with the land use planning role that has a very fuzzy consensus mission, and the transportation planning role with a more specifically defined implementation structure, primarily related to programming or allocating funds, and you see some of the difficulty of initiating the new "kid on the block" air quality relationship.

With the inclusion of air quality management in the regional planning game, it is necessary to look at the existing planning process a bit. We still tend to have a consortium of regional agencies of one type or another talking a coordination game but actually marching to whatever their individual policy bodies dictate. Often their intentions are good, but the time and effort to interact and coordinate is not programmed well enough to make it happen even if they want it to take place. Often there are subtle power struggles that take place just because they all exist and they have to do their designated thing. As much as each would like to coordinate with other single purpose functions, they spend most of their time doing what they were mandated to do and very little time trying to coordinate and integrate their efforts with each other.

Until there is a real concerted effort to understand the missions of each—whether they be a planning agency, a regulating agency, or an operating agency—there will not be the unified purpose that is necessary to work out the best approach in the best interest of all the people in any given region. The solution to this, more often than not, seems to indicate some level of institutional or governmental intervention that suggests a new level of government. This then becomes the focal issue revolving usually around make-up of the governing body—a body elected at large or an appointive body consisting of locally elected officials. In the Bay Area this is the primary issue. There seems to be general agreement that some overall umbrella agency is needed at the regional level, but how it is to be governed is a "gut" issue.

BAY AREA REGIONAL GOVERNMENTAL STRUCTURE AND PROCESS

In the Bay Area for instance, we have the Association of Bay Area Governments (ABAG), which is the area-wide COG responsible for comprehensive planning. This strictly voluntary body is attempting to present a regional consensus regarding land use planning. The Bay Area also has a plethora of statutory regional single purpose agencies: MTC (Metropolitan Transportation Commission) for transportation, BCDC (Bay Conservation and Development Commission) for Bay preservation and regulation, BAAPCD (Bay Area Air Pollution Control District) for regulation of preservation and restoration of air quality; BASSA (Bay Area Sewer Services Agency) for Bay Area sanitary sewer service, BAWQCB (Bay Area Water Quality Control Board) for maintaining water quality standards, and two Coastal Commissions for preserving the coastline within the Bay Area. Each of these agencies has its own marching orders with varying degrees of instructions to consider the plans of the others as well as that of ABAG. Along with this, the District Office of CALTRANS (the basic highway planning agency within the State structure for the Bay Area) has critical programming influence on the development of the area. Five major transit operating districts—BARTD (Bay Area Rapid Transit District), AC (Alameda-Contra Costa Transit District), GGBHTD (Golden Gate Bridge, Highway, and Transportation District), S.F. Muni (San Francisco Municipal Railway), and SCCTD (Santa Clara County Transit District)—are also key players in this overall institutional structure. Each of these agencies has varying degrees of clout that can affect what happens in the Bay Area.

Obviously, someone must take the lead in coordinating or integrating this "clutch" of regional agencies and missions. "How should it be accomplished?" is probably the key question facing the Region; however, there is some doubt whether the person on the street really perceives his/her problems as being related to this phenomenon. How is it now being handled? The answer to this is probably to say that it is a "mockery of ad hockery." Everyone is somehow trying to relate to the other, with some seeming to have more concern, or a better grasp, than others.

MTC for instance—and believe me I am not trying to say that it is the key influence—has embarked on a course that posits the following: MTC is a single-purpose regional transportation planning agency, which has a mandate to consider comprehensive planning as it relates to transportation projects; however, since MTC has little business being a land use agency, it should attach itself to the existing land use planning agency and strive to do everything possible to carry out that land use planning posture, to understand it and contribute to strengthening the process. To this end, MTC has striven to support ABAG as that agency by providing staff to the joint ABAG-MTC team efforts and, more importantly, by providing funds from MTC to contract for land use planning inputs as a basis for the transportation plan. In other words, MTC must support in a real way the staffing of ABAG to do its job and to try to transfer to ABAG some of the clout MTC carries as an implementation agency. This has not been an easy process from either side and one might say it is ludicrous that such a situation should exist.

However, there is probably some question as to whether a relationship such as this (which is formalized by a joint power agreement between ABAG and MTC) is not stronger than a voluntary COG that is given charge of doing both land use and transportation planning but which has very little real clout other than the A-95 review and comment. For instance, MTC in its relationship with ABAG can hopefully jointly share the responsibility of saying "yes" or "no" on a transportation project and thereby play a stronger role than just the A-95 action.

So far, this discussion has revolved around the joint power relationship worked out between ABAG and MTC. What about the relationship with the Air Pollution Control Board, BCDC, BASSA, Water Quality, and the Coastal Commissions? That is a very good question. As noted earlier, MTC is supporting ABAG's regional planning, both with an MTC staff commitment to the joint planning team as well as considerable commitment of funds to strengthen ABAG's staff capabilities. MTC feels, however, that as a single-purpose agency it cannot necessarily set itself up as a conscience of the Region. It has promoted publicly, both policy and staff-wise, the desirability of other regional agencies joining in support of ABAG's comprehensive planning mission. This is particularly true relating to the Air Pollution Control Board, which under its regulatory powers for stationary and complex source findings could do much to assist ABAG in carrying out its land use goals. The BAAPCD, I am happy to say, is working with ABAG and has made an initial funding commitment, although it is a modest one. BASSA is also working on a funding program with ABAG.

MTC has established a very close working relationship with the BAAPCD, particularly in its travel forecasting efforts to assure the best inputs possible relating to Vehicle Miles Traveled (VMT), for joint consideration in air quality modeling and other approaches that will be discussed later. MTC is also taking a lead role in developing an environmental assessment procedure from the transportation viewpoint, but necessarily relating to land use and air quality strategies as well. MTC is hopeful that as this process develops and as the Region's institutional structure progresses, it can be utilized in an overall planning process. MTC needs the system now to be better equipped to be a strong player in the resource allocation game, or forever be only a sideline player. This paper will try to lay out this process and give some indication as to how it might work.

AN OPERATIONAL STRUCTURE OF IMPACT ANALYSIS—INTERRELATING LAND USE, TRANSPORTATION, AND AIR QUALITY INPUTS

The previous sections of this paper have reviewed some of the past and present deficiencies in planning approaches to integrated Land Use-Transportation-Air Quality Planning. Introduction to the regional governmental structure characteristic of the Bay Area provided previously should also be useful to introducing this section of the paper, where the purpose shall be to present a concise and simplified process for interrelating these three broad areas of planning. As indicated previously, the Bay Area does not possess the ideal situation for an integrated planning process. However, the availability of the various functional regional agencies mentioned previously, with their respective analytical capabilities, does make this area somewhat more suited for beginning an integrated planning approach than other metropolitan areas.

Explanation of the process provided herein will necessarily be a simplification of a more complex procedure. However, in its most complex form this process is not purported to be a complex, computer-based, mathematical model. Rather, the procedure might more accurately be termed a "handicraft model" which can be supplied with direct input of goals, policy guidelines, criteria, environmental standards, and various other evaluative factors. The nature of this "handicraft model" gives it extreme flexibility, and at the same time permits the broad range of inputs necessary for an interdisciplinary planning process.

Generally, the discussion of the planning process developed here for the purpose of interrelating Land Use, Transportation, and Air Quality analysis and decision-making will follow this outline:

1. A brief abstract of the process with a general description of each major area of input will be provided.
2. A discussion of the major objectives of the process will elaborate on the usefulness of this procedural approach to planning.
3. Detailed process description with accompanying schematics will provide a step-by-step procedural analysis.
4. A brief discussion of potential application of the process and general conclusions will complete this presentation.

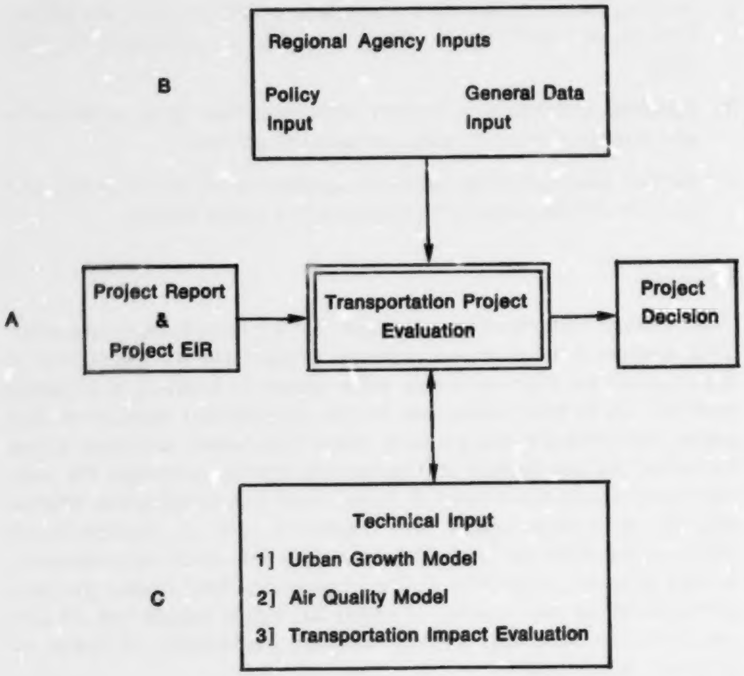
Abstract

The process described in this paper for an interdisciplinary planning approach is oriented towards project review. Adoption of the process for plan review or other levels of analysis is possible and will be briefly addressed in the Application section of this paper. Furthermore, the process described herein will have transportation project review as the central theme. Although the central issue could have been a major land use project not related directly to transportation, our Agency's role in transportation analysis provides us with greater insight into such an approach. A very general schematic of the interdisciplinary review process is provided by this overlay (Exhibit A). Basic inputs are all that are provided here and a more detailed explanation of these inputs will come later.

1. Initial input to project evaluation is necessarily the project description and any analytical data associated with the proposed project. Also basic to the analysis would be any environmental impact reports prepared for the project.
2. Regional agency inputs related to policy and general data would also be solicited. It could also be the task of a regional land use or transportation agency to provide policy guidance which reflects the plans of the local jurisdictions. However, the guidance for air quality policy is not a local matter and

EXHIBIT A

Summary Review Process


B
Regional Agency Inputs
Policy Input
General Data Input
A
Project Report & Project EIR
Transportation Project Evaluation
Project Decision
C
Technical Input
1] Urban Growth Model
2] Air Quality Model
3] Transportation Impact Evaluation

will generally be provided on a regional level and in some cases may be most appropriately solicited from EPA.
Data provided by regional or local agencies might include land use data, demographic data, traffic data, and any other data that might not be used for analysis within modular input. However, some non-model data provided for project review may serve a different purpose from the same data provided in the land use, growth, or air quality models.

3. A second form of major regional input into project or plan review could be through the use of land use or air quality models. Technical input from available computer facilities may also be utilized in providing input on the analysis of transportation project or system impacts.

The product of these various inputs to the evaluation process would ostensibly be a decision-making process whereby conflicts and alternatives are considered, and staff and public review would culminate in a decision on whether to accept or reject the proposed project.

The general process just outlined will be further delineated following a discussion of the objectives.

Objectives of the Evaluation Process

It is the purpose of this paper to present a multi-disciplinary assessment procedure utilizing land use, transportation, and air quality inputs to provide the user with a continuous problem management capability with respect to assessing regional project impacts. The intention is that the overall decision-making process will be expedited by the following objectives:

Introducing environmental considerations at an early stage in the planning process. Use of the data, policy, and model inputs should reduce the likelihood that detailed traffic and engineering studies conducted by the review agencies will be void of environmental concerns.

Increasing the scope of information available to decision-makers. Proper use of the various data and information input can be transformed through the evaluation process into a form useful to the political decision-makers. Furthermore, appropriate use of the detailed information inputs on a project level will provide for a systematic review of regional transportation or land use plans and thus better equip staff and decision-makers to consider plan amendments.

Provide staffs with the ability to determine the regional environmental impacts for given projects or plans. Staff use of the evaluation process can expedite the illustration of various trade-offs involved in alternative choices. The ability of staff to spell out these choices will be strengthened by its ability to explain the implications of the choices.

Providing relatively rapid impact analysis. The establishment of a systematic controlled procedure which can be followed with relative ease should permit "crisis situations" where analysis is needed quickly to be more effectively handled.

Assisting in the evaluation of Project Environmental Impact Reports. Where total project review is not necessary (such as for decision-making), application of the process may be oriented towards checking the validity of impact reports. Furthermore, if the regional agency is involved in the drafting of the EIR, then application of the evaluation process may eliminate duplication.

Indicating what mitigating measures are needed to minimize negative impacts. The process of identifying negative impacts also yields an understanding of what may be necessary to control those impacts. The interdisciplinary nature of this process permits analysis of the negative impacts on land use as well as on air quality.

Relating project scale decisions to overall system concerns. The process provides a systematic method for checking project impact against regional plan policies or objectives.

Finally, an objective of the process is to explicate the effects of the project agency's decisions on other governmental agencies. Awareness of these interrelationships between regional land use, transportation, or air quality agencies should encourage more cooperation and coordination between these agencies.

The Procedural Outline

Description of the Impact Assessment Process alluded to earlier in this paper will be based on the schematic on this overlay (Exhibit B). Discussion will follow the steps of this process, with appropriate detail being provided at each interval.

Generally, this Impact Assessment Process establishes the basis for discerning impacts from processes underway, determines impacts of regional significance, and utilizes pre-established criteria for measuring conformance to regional goals and policies. In order to accurately discern impacts attributable to a project, as opposed to what is likely to happen anyway, one must have a good understanding of trends already underway. Basic to the determination of predominant trends is a description of the environmental setting of the project.

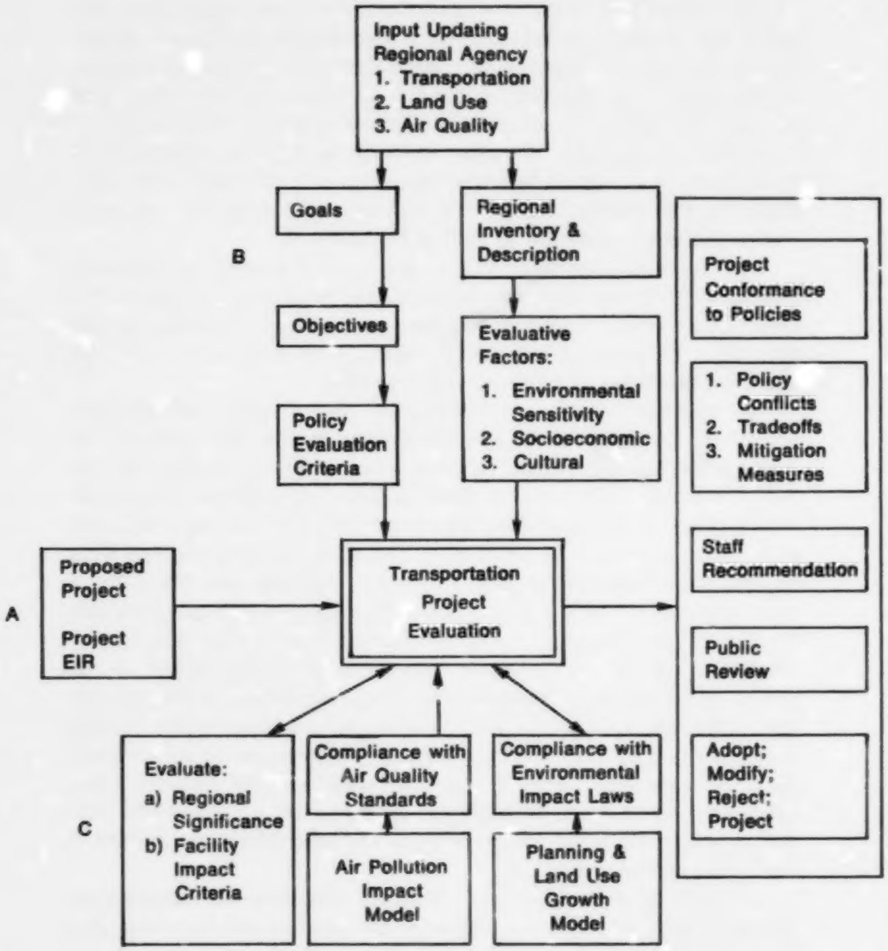
Utilizing the schematic presented here, the input for environmental description will be through the Regional Inventory and Description. Input data from respective regional agencies should provide a continuously updated information base which can be used to determine or observe major trends.

In considering the availability of data types, the primary source for regional land use information in the Bay Area is the Association of Bay Area Governments (ABAG). Acting as the Bay Area clearinghouse for A-95 review, this council of governments receives detailed land use data from the various municipal and county planning departments. The joint policy plan, and data coordination between ABAG and MTC, provide the basis for a meaningful information input and exchange such as is necessary for the review process being discussed here. Thus the implementation of this process is more easily expedited in areas where regional governments with responsibilities in transportation and land use already exist. However, when a specific project is being analyzed, a comprehensive approach can be established by a local agency doing all the inter-agency coordination itself. Such an undertaking is, however, often so time consuming that the urgent nature of many project reviews does not permit a detailed level of analysis.

Air quality data used for input to this Impact Assessment Process is provided by a regional air quality agency—the Bay Area Air Pollution Control Agency. Originally the Agency was set up under state law, although similar regional agencies now exist

EXHIBIT B

Impact Assessment Process


Input Updating
Regional Agency
1. Transportation
2. Land Use
3. Air Quality
Goals
Objectives
Policy Evaluation Criteria
B
Regional Inventory & Description
Evaluative Factors:
1. Environmental Sensitivity
2. Socioeconomic
3. Cultural
A
Proposed Project
Project EIR
Transportation Project Evaluation
C
Evaluate:
a) Regional Significance
b) Facility Impact Criteria
Compliance with Air Quality Standards
Air Pollution Impact Model
Compliance with Environmental Impact Laws
Planning & Land Use Growth Model
Project Conformance to Policies
1. Policy Conflicts
2. Tradeoffs
3. Mitigation Measures
Staff Recommendation
Public Review
Adopt; Modify; Reject; Project

throughout the country as a result of Federal mandates. The use of the data available on a regional scale generally requires input to a computer simulation model which is not often available to an agency without extensive data research personnel and terminal connections to computer facilities. The availability of these facilities at MTC is partially the result of the State's intention to set up a regional transportation agency with close ties to all aspects of planning; moreover, the easy exchange of data facilitated by a direct link to air quality, land use, and transportation data has provided the groundwork for future work interrelating these areas.

Use of the data accumulated by MTC and other regional agencies should provide a description of the environmental setting which embodies both the natural and cultural systems; information characterizing the attributes of these systems could also be assembled according to their respective subsystems. For example, the following component breakdown of a natural environmental system exemplifies the system's respective subsystems:

1. First would be an "Inventory of Natural Processes"
2. Second, a listing of "Problems and Opportunities," including:
    a. Evaluation Factors
    b. Opportunities and Constraints for Development
    c. Environmentally Sensitive Areas
3. Third, an examination of "Trends," including:
    a. Growth
    b. Water Supply and Demand
    c. Mobility and Travel Demands
    d. Air Quality

The systems such as the natural system just outlined in an abbreviated form are interacting dynamic processes that can determine various problems and opportunities. Use of the Impact Assessment Process permits the attributes of these systems to be interpreted and reconstituted in terms of a social system. That is, a social value system is implicit in the goals and objectives guiding the analysis. Moreover, it is the information reconstituted in terms of this value system which forms the evaluation factors useful in the assessment of impacts.

In order to establish a form of measurement for the conformance of any proposed (transportation) project to goals and objectives of a plan, it is necessary to establish evaluation factors. The evaluation factors should be rules, standards, or tests upon which a judgment can be made. These factors may be based on sound planning standards, or on recommended or adopted state or Federal land use standards and air quality or transportation standards. Subsequent to the use of the evaluation factors for assessing project compliance with a plan, it is critical that a method for mitigating any adverse impacts be established if a project is to be carried out.

It is, therefore, the confluence of evaluation factors which constitutes the natural and cultural systems which serve to identify geographic areas which afford opportunities and constraints to development. Moreover, the application of these evaluation factors, which insure compliance with the policy evaluation criteria, is the means by which conformance to overall plan goals and objectives is assessed.

Concurrent with the work involved in regional environmental description and the determination of policy direction, the Impact Assessment Process should review that information provided in the project report and the Environmental Impact Report. Review should be conducted to determine the **adequacy** of environmental descriptions, project alternatives, project impacts, mitigating actions, and so forth.

Once the steps in the Assessment Process (see Exhibit B) embodying Parts A and B have been completed, the major inputs for predicting project impact will be conducted through Part C. Also, if the combination of those inputs to the Project Evaluation Process shown on the upper part of the schematic (B) (i.e., Goals, Objectives, Policies, and Regional Inventory and Evaluative Factors) form the basis for past trends and for opportunities and constraints, then the concept models and other inputs in the lower portion of the schematic (C) form the basis for anticipated trends and probable impacts of the proposed project. Furthermore, it is use of this more detailed and analytical aspect of the Impact Assessment Process that should determine any changes in trends that could be attributed to the proposed project.

For the sake of simplicity and clarity, explanation of the use of Part C of the Assessment Process will be based on the analysis of a transportation project's impact. Evaluation of the "regional significance" should be conducted based on predetermined criteria. Local "non-significant" impacts should result from such application. Also, a product of the "regional significance" analysis of a project should be a determination of the "project area" to be used as an evaluation base. The "project area" can be described in relation to various units of analysis including: corridors, market areas, or given physiographic units.

The determination of the direct impact of the project will utilize facility impact criteria which are generally closely related to policy guidelines. However, a major basis for assessing facility impact is provided by the extensive data base that should be available through the Regional Inventory and Evaluative Factors—Part B. Basic to this information should be regional scale maps illustrating the evaluative factors such a Physiography, Geology, Climate, Hydrology, Soils, Vegetation, Population, Employment, Land Use, and any other natural or cultural process factors which are applicable. The direct impacts of transportation decisions stem from the displacement or disruption caused by the location and design of a facility. Use of the evaluation criteria and overlay maps which interrelate the factors provided graphically can generate measurable effects of a facility.

Indirect impacts of the facility in terms of induced growth can be analyzed by the concept model for urban growth. This planning and land use model is basically a procedure for allocating growth to specific geographic locations. The model is a "handicraft model" rather than a computerized model and is, therefore, extremely flexible and adaptable to local area situations. Relationships that are difficult to quantify—such as climate effects on residential demand—can be reflected in the model's output. However, since many aspects of the growth model are not quantitative, the use of the model involves many situations where judgment is a major determinant of the output. The judgments, however, should be made within the restrictions of a formal process with explicit guidelines in order to provide for model consistency and reliability. Moreover, judgments made at every step should be recorded so that the way the model depends on judgment can be understood and the effects of different judgments can be tested. The growth model has a number of uses as it relates to the probable impact of a proposed project. For example, the model can assess the probable impact due to changes in access created by the project. Thus, in many cases increased access to a given area will alter growth trends by inducing growth in the area newly served. Induced population growth and land absorption may also affect water demand and supply which may be analyzed by application of a Geohydrologic Model for the purpose of predicting future water supply and demand.

A third use of the growth model would be to assess the relationship between increased access, induced growth, and travel behavior and mobility.

Another major area of detailed project evaluation—in addition to "Regional Significance" evaluation and growth modeling—is the analysis of air quality implications of a proposed project. An air quality model may have many uses in evaluating project impact but major uses would include the following:

1. Estimated changes in point source and mobile emissions due to increased access
2. Estimated emission changes caused by the induced growth impact of the project
3. Changes in emissions resulting from changed travel patterns due to access improvements
4. The total impact of air quality as it relates to meeting Federal or state air quality standards

Use of the various inputs incorporated in Parts A, B, and C of the previously exhibited Assessment Process schematic (Exhibit B) determines the desirability of the project, and the proposed course of action to be taken on the project.

However, prior to arriving at a decision on the appropriateness of the project, all of the previously described inputs should provide the basis for the following decision-making parameters:

1. The impacts of the project should be ranked for conformance with the regional plan goals and objectives and tradeoffs should be determined. In this process (in addition to project impact assessment) separate functional and financial evaluations are combined so that overall conformance can be displayed. The tradeoffs between objectives (such as sacrificing natural resources for increased mobility) can be determined and the results can be used for recommendations on new project priorities.
2. Once policy conflicts and tradeoffs have been resolved, potential mitigating effects can be determined. Determination

of these effects would be the basis for recommendations for adopting project priorities. The effect of mitigating measures in reducing negative impacts can be determined by reassessing the impacts of proposed actions and measuring "net impact," that is, gross impact minus reduction in impact due to mitigating measures.

3. Alternatives must also be considered which may indicate closer conformance to plan objectives. Thus, recommendations for adopting project priorities may rest on the consideration of new alternatives.
4. Finally, a preliminary review process with other agencies and the establishment of a process of public review should culminate this process which will result in a determination of project acceptance or rejection.

This completes the basic outline of a process which we are attempting to implement in the Bay Area and one which we feel has the flexibility to be used by other single or multiple purpose agencies.

Application

The flexibility of the Impact Assessment Process just described permits its application for broader subject matter than the transportation project level just described. Substitution of transportation plan or corridor review could easily be accommodated by the process. Use of the process with a land use project or plan as the central theme would also be easily accomplished, although any change in application of the process would necessitate a change in the emphasis and relevance of various inputs. However, the breadth of the application of this process will be a function of the ability of the agency applying the process to generate the necessary inputs for analysis. This will be to a large extent a function of the extent of coordination of single function agencies in the area and their desire to make integrated Transporation-Land Use-Air Quality Planning a reality.

Conclusion

Although one cannot perceive this Impact Assessment Process as a panacea to the problem of communication and coordination gaps between agencies with responsibilities in the areas of Land Use, Transportation, and Air Quality, one can look upon the process as a first step in the direction of more effective comprehensive planning. However, extensive groundwork is necessary on several levels to make the process function smoothly. First, the legislative process must take on the responsibility of establishing regional authorities which have more clout than has been the case in the past. Also, the mandates for these agencies must include responsibilities outside their single purpose function. The trend for this change is established by the fact that more transportation agencies are employing land planners and experts in air quality while more land planning agencies are enlisting transportation and air quality experts. But one cannot assume that the mere availability of a diversified staff will insure coordination among agencies. The establishment of joint resolutions, work programs, and committees is a must for the successful implementation of coordinated Land Use, Transportation, and Air Quality Planning. In the case of the Bay Area the creation of a statutory comprehensive regional agency may well be the answer.

Finally, the oversimplification of the process presented here must be viewed with caution since the coordination of efforts among agencies may often entail the complex task of evaluating the more nebulous problem of a transportation corridor or plan impact. In such cases the complexity of evaluation on a project level (as discussed here) may seem elementary. Whatever the level of analysis may be, however, the data and information input necessary will demand that sophisticated tools of analysis become an integral element in the process, for although the development of knowledge on the interrelationships between Land Use and Transportation Planning and Air Quality analysis is still in the rudimentary stage, the complexity of the data and information bases in these areas is rapidly increasing.

Comments

Richard S. DeTurk
Tri-State Regional Planning Commission
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Commenting from the perspective of a civil servant working within the framework of regional planning for land use, transportation, and environment, I suspect that there is more agreement among

Mr. Watt and others at this conference than might appear from seemingly diverse statements. I applaud the Impact Assessment Process proposed by Mr. Watt. But I believe the underlying problem in most of our discussions is institutional, not technical. Mr. Watt referred to this in the first part of his paper. We—the environmentalists on one side, and the land use/transportation coalition on the other side—are just not communicating properly. We are dealing at arms length with each other.

My thesis is a rather simple one: that the environmental interests—through the EPA—should participate directly in the regional planning process. What we have now is a sequence where environmental plans are made by environmental agencies, and then regional planning agencies react to them.

Take my Region as an example. The Transportation Controls plan for the New York Metropolitan Area was submitted by the State as required by law; most of the technical work was done by the City of New York—the Department of Air Resources to be exact. It did not cover the New Jersey or Connecticut parts of the Region at all; indeed it could not, since this was not an interstate plan. The plan was prepared under extremely short deadlines without much participation by other agencies. It was as good a product as one could expect under the circumstances—emission strategies are good, but some of the urban development strategies are very doubtful. Now it is having difficulty finding a broad base of support for implementation. After it was issued and made official, the Tri-State Regional Planning Commission was required by the Federal Highway Administration to assess its transportation plan to assure consistency with the Air Quality Transportation Control Plan. This is without any chance to participate in making the plan.

It is my belief that the making of such plans (and the same would go for water quality) should be done within the framework of regional planning. There is an environmental gap in our regional planning that might be narrowed by a process along the following lines:

1. Air quality standards set by the Federal Government and the states
2. Allowable emission loads in each air quality control region determined by the states

3. Hardware strategies (emission controls) established by the Federal Government and the states
4. Additional strategies (traffic and land use) needed to reach allowable loads developed by localities working through the regional planning commission

For this to come about, based on my experience, will take aggressive leadership and a program of financial support by EPA. In return the environmental agencies would want (and should get) representation on the regional planning board, and full staff competence for environmental planning in the regional planning agency.

The addition of this new function would not be an unusual evolution of regional planning. In addition to land use and transportation, many regional agencies are now taking up planning for housing, recreation, and energy conservation. In each case the planners must be careful to limit themselves to system planning, and not try to out-expert the experts in their own field.

I personally believe the air quality standards can be met; but there are many different strategies or combinations of strategies that can be employed to achieve the standards. The alternatives should be weighed, choices made, priorities set. This is the essence of urban planning; and regional planning agencies are unusually well equipped to do this work with information on land use, population, employment, and transportation, and analytical techniques for regional measurement.

What I am urging is for EPA to create a program like HUD's 701 program and DOT's 134 program, and to join with them in supporting a single agency to do planning at the regional level. State and local officials, working through their regional planning agency, could perform this function.

Air Quality Management Using Land Use And Transportation Planning And Controls

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I have never had the experience of, pardon the expression, old-time air pollution control officials—the experience of limited public interest, minimal funding, and total resistance on the part of industry. The days of apathy and "smoke chasing" are memories to my former associates in air pollution regulatory agencies. Today, these regulators are confronted with new opportunities through public and legislative support, but also with the new problems of traffic management and land use planning. Traffic and land use professionals have themselves had difficulty with these problems and now the added burden of environmental restrictions make the traditional way of problem-solving an impossible one. Thrust upon the generally uninformed air pollution regulator, these burdens are extremely difficult to manage as professionals want to manage them. Not only are there too many actions to be taken within tight time constraints, but they all must be taken in the goldfish bowl of a political world. And it is the political world which has caused the frustration of the Clean Air Act.

We are all aware that the planning of land use comes into play in three requirements of the Clean Air Act. First, cities and states develop Air Quality Implementation Plans to reduce high existing air quality levels, and many plans include land use strategies such as parking management. Next, we are required to regulate indirect sources—new facilities which have the potential for creating sufficient pollution to violate the air quality standards. Finally, the Clean Air Act requires plans to maintain clean air levels after they have been reached. All require land use controls.

But land use controls are really different things to different people—some good and some bad. Land use can be the vehicle to control people density or it can be the vehicle to exempt racial or ethnic minorities. (When I was Commissioner of Air Resources in New York City, I was asked to intervene in the dispute over the low-income Forest Hills housing project on environmental grounds.) Land use can be the vehicle to prevent exacerbating overloaded water and sewage systems. It can be the vehicle to attack noise, congestion, and air quality problems of transportation and related problems. And it can be the tool on fiscal issues to oppose tax increases for capital needed to expand city services.

I believe the environmental laws—and the Clean Air Act in particular—have been misused, simply because it was "the only game in town." Private citizens lacked the legal alternative or possibly the experience and resources to fight projects or individuals that they opposed, so they chose to stand under the banner of Clean Air and fight projects under the Clean Air Act.

It is now apparent that the Council on Environmental Quality would like to use the 1972 Federal Water Pollution Control Act to establish land use policy. They would like sewer construction and location and size of treatment plants to be such that future land use is defined by that means. Lacking an effective land use control measure, even the Federal government is playing with whatever tools are available.

Returning to the Clean Air Act, it is essential that the objectives of the Clean Air Act be met. Further efforts must be made, using the Clean Air Act in opposition to projects which violate the objectives of that Act, but it is improper that the Act be used for other purposes. It was offensive to me when the air quality issue was raised in Forest Hills—a neighborhood which met all air quality standards prior to any new controls. It is also objectionable when the Act is used by communities against projects when the real concern is the fear of real estate speculation or community dislocation. Our laws ought to serve the functions for which they were intended and should be amended if they do more than their sponsors desired or their constituents want. The Clean Air Act has one objective—clean air. It is a constraint—not the guiding force—in the land use process, and it must be used with discretion or, as has already occurred, we will face the backlash from overzealous efforts.

Having set out my philosophy, I should turn to the discussion of running an urban air management program emphasizing land use and transportation controls.

New York City had, in 1973, according to published figures, the largest air quality program in the country, totaling 377 people. The accomplishments from 1970 to 1973 were dramatic: city-wide averages for sulfur dioxide and particulates dropped 70 percent and 30 percent respectively, so that those city-wide averages met the primary health standards. When we looked at the requirements of the Clean Air Act in regard to transportation controls, we determined that the air pollution control engineers and inspectors on the staff were not qualified for the job that had to be done. We then developed within the Department a staff of about 25 people whose job was to plan for meeting the transportation-related air quality standards; we had specialists who tested motor vehicle emissions, both light- and heavy-duty; urban and transportation planners, as well as modeling experts. That pool of talent produced a transportation air quality plan that was one of five accepted by the Federal EPA in mid-1973, the only one for a city which most people consider has a transportation and congestion problem. That pool of talent was unique within air pollution control agencies and probably remains unique even today.

Well, we developed a plan (it was approved in June 1973), and for several months we made some progress. It was a bumpy road, but we made progress. Then, a change in administration occurred: the new administration recalled the days in the early 1960's when they were last in office, and went about retooling the organizations to fit the mold. Today, rather than 25 people in transportation and land use planning, there are four—and progress in implementing the plan in 1974 has been non-existent, and in fact signs point to retreat from the progress previously made.

The experience in New York City administration over the last year, however, is not unusual and reflects what normally occurs in state and local government. That is, the Transportation Commissioner says that transportation planning is his responsibility, not that of the environmental chief, and the City's Planning Commission Chairman says land use planning is mine, not the environmental chief's. That is what happened in New York City, and the failures in implementing the transportation plan over the year can be traced to that philosophy.

My conclusion from this is that environmental managers must move aggressively into land use and transportation planning, and funding of local and state air quality programs must be keyed to having these skills on staff, not just available in another agency. While some air quality control administrators may have the courage to fight their City Hall, they must have the full backing of the Federal EPA and others in that fight.

Assuming that the operation is organized in the fashion described, what are the steps in the process of planning? First is the analysis of the problem, and vital here is the analysis of the data. As an example of how not to plan, I would like to follow through the example of the present parking strategy in New York City.

When the plan was developed in 1973, it was apparent that the auto traffic had to be reduced in the central business district (in the area south of 60th Street) in Manhattan. Short of banning cars outright, it seemed that the best way to meet that objective was to reduce the availability of parking to increase the deterrent for cars to be brought into the area. The plan was vague as to details, stating only that legal and illegal parking spaces must be reduced by 50 percent. The idea was—at least in my mind—that specific regulations would make an approach which was workable, but a lot of study was needed.

Well, we opened Pandora's Box. First, there tends to be a difference between state and city agencies on how these programs should be implemented. Then, there tends to be a difference between city agencies. The City Planning Commission has for fifteen years attempted to develop a logical parking policy for the City, but never had the legal basis to do it. But now they had the Clean Air Act and intended to use the Act for their purposes. Three agencies—three plans:

1. The State Environmental Agency says you need a permit for all new parking spaces in Manhattan.
2. The City Planning Commission says: "We may give you a permit if you trade two existing spaces for the one you want," but limits their regulation to the central business district, not Manhattan as the State does.
3. The City's EPA says simply: "We have new data and we need to eliminate 30-40 percent of the parking spaces and 'open-air parking lots' make up 30 percent of the spaces (the rest

are permanent garages), so let's remove 'open-air parking lots.' " It doesn't matter where the lots are now located or whether they coincide with the air pollution problem—just eliminate "open-air lots."

In analyzing the problem, we must examine the available data. Manhattan can be broken into four parts:

- — Northern Manhattan: north of 60th Street
- — Midtown: between 34th and 60th Streets
- — Valley: between Canal and 34th Streets
- — Downtown: south of Canal Street

Unfortunately, data do not exist except in midtown, downtown, and isolated parts of the valley. Those data indicate a problem exists, but the casual observer of traffic in northern Manhattan or the valley would surmise there is no real carbon monoxide problem. In any case, data must be gathered to prove the need for regulation or the regulation is excessive. I am sure that lack of good data is a common fault for all programs.

With the solid data base, you can then identify where the problem exists and where no problem exists. I would guess that midtown and downtown are legitimate problems in New York City, while northern Manhattan and the valley are not and should be excluded from regulation. After defining where the problem is, it can then be determined what causes it and what will correct it. In New York City, it is more likely to be a taxi or truck problem rather than an auto-caused one, but that is unique to our city.

I would like to take the opportunity to talk about one strategy that I consider promising as a way to controlling transportation-related pollution that is not receiving the credit it deserves. That is the "traffic management." If I have one overriding complaint about EPA's interpretation of the Clean Air Act, it is the demand for quantifiable results with each strategy. The effect of computerized light systems, more police enforcing traffic regulations, and better utility maintenance scheduling in our streets, therefore, are not considered at all or are given only marginal credit in the analysis of the Transportation Plan. It seems to me the way to test and credit plans with "traffic management" improvements is to schedule implementation of traffic management schemes, first; then, after they are in effect, accumulate new data to determine how far one must still go with more impolitic strategies.

If we solve the short term problem by some means in our Transportation Plans, we are still left both by law and good sense with the need to maintain these levels within legal limits. How do we analyze for that?

I think the place you begin is your present zoning laws. These laws establish the potential density in an area. To me, as an example, the New York City Zoning Resolution violates the intent of the Clean Air Act as regards the maintenance of air quality standards. If all developers chose to build to the limits they are now allowed, there would be a doubling of population in an already crowded area. The result would be a dramatic rise in traffic and traffic-related air quality problems. It also means greater requirements for heat and power and thus a greater need for boilers and power plants. And it also means more solid waste, and thus the possibility of more air pollution from incinerators or other forms of processing.

To attack the zoning laws as they are is a significant change from present methods of action. The present way is to fight only "exceptions" to the zoning laws. If you are a developer and want to build a structure, you expect no problems as long as there is no change from the zoning rules. If, however, you want an extra few floors, then the flag is raised and the battle begins. It seems to me that, if the Clean Air Act intent is to be followed, then local government must get control of its zoning laws.

How can zoning controls be used to control air pollution?

1. They can control people density by restricting building size.
2. They can control type of structure by type of building allowed: residence, commercial, or industrial.
3. They can control people density by moratoriums on sewer hookups or building permits and water or sewage connections.

A few examples of moratoriums were listed recently, and I would like to go through them as examples of control:

1. In San Jose, California, a referendum was passed banning for two years new residential zoning in areas where schools were overcrowded.
2. Outside of Atlanta, a six-month moratorium was placed on construction so the county could digest the 29 developments already built or under construction.

3. In Savoy, Massachusetts (present population 420), new construction is banned if it causes the town to exceed a population of 10,000.

A final area of examination is how to handle problems of presently clean areas. We are concerned with "urban sprawl," as we should be. An indication of sprawl is the fact that "urban population density in the United States has been steadily declining for half a century, from 6580 people per square mile in 1920 to 4230 now." The Federal EPA, it seems to me, missed the boat in dealing with "non-degradation" issues. The advantage of Federal control of a process is that it leads to uniformity of regulation in states. We deal in an economically competitive society, and as a result—with one or two exceptions—it is still the tax base that governs most decisions. Under the circumstances, issues of "urban sprawl" and "open space" cannot be solved at the state level. It will take courageous governors, Federal legislation, or a strong citizen group to solve that problem.

I believe the points I would like to leave behind after this discussion are these:

1. We need a national land use law so that our environmental laws are not used as substitutes for it.
2. We need traffic engineers and land use planners in our air quality agencies so that those agencies have the proper perspective to do the planning required to implement the Clean Air Act.
3. We need technical and financial assistance to fully understand the zoning process, why it has created and will create more air quality problems, and how we go after that law to make it more manageable in solving our future air pollution problems.

Comments

Charles Z. Szczepanski
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U.S. Department of Housing and Urban Development

It was most rewarding to listen to Mr. Hart's experiences and successes in the management of air pollution control in New York City. My comments will concentrate on land use management tools—their scope, effectiveness, and the appropriate administrative structure for air quality and land use management cooperation.

To present HUD's view of the process of air quality management it is useful to structure the elements of land use which act as air quality management tools.

At the **macro scale** there are:

- — community goals and growth concepts,
- — location of industrial zones and of large industries,
- — location of new communities and new growth sectors,
- — green belts, open space, and recreational areas,
- — location of agricultural and forestry activities,
- — location of transportation corridors;

At the **intermediate scale** there are:

- — definition of the type of use for each sector,
- — density or intensity of activities,
- — modal structure and specification of the transportation system, such as: auto, transit, and pedestrian modes,
- — selection of all infrastructure systems, including basic technology for utility systems and the type of service;

At the **micro scale** there are:

- — definition of the capacity of each sector in the metropolitan area,
- — development of community plans including three-dimensional concepts and utility characteristics,
- — development of plans for each site considering aerodynamic characteristics of topography and structures with their micro-dispersion effects,

— specification of air quality requirements for selected activities.

Most major macro, intermediate, and micro scale land use tools usually receive regulatory authority through the zoning process. How can these tools be activated to serve air quality and general community objectives? Listening to the introduction of the paper, I got the impression that in times of advanced environmental technology, the air pollution control agency manager has to assume factual responsibility for many land use decisions. However, this runs contrary to the prevailing structure of state and local government. Such structures were designed on the assumption that regional land use decisions, crucial to the efficiency of air quality management, can only result from a truly comprehensive land use planning process in which the air quality agency and other agencies play the necessary role of technical advisors. The land use planning agency normally is and should be responsible for the formulation and implementation of an integrated environmental plan. If the air quality agency performs its important role, but remains a "team player," air quality goals will best be served.

In the discussion of our subject there appears to be a tendency to equate land use planning, which is a comprehensive political process, with the land use element in transportation planning, which is only a carefully calculated technical hypothesis of growth, with limited political screening. When pressed by short deadlines, one can understand the tendency to adopt an existing, readily available, and technically sound land use hypothesis such as the one used in the transportation plan, because the slow and complex comprehensive land use planning process seldom results in an officially-approved product, and changes are constantly being introduced to the plan. Nevertheless, only the land use alternatives developed by the land use agency, in close cooperation with the air quality staff and with other functional planning agencies, will have a high correlation with final implemented forms of growth, and will represent a balance among the multifarious objectives of the community. The land use agency has most extensive familiarity with mechanisms of city growth and should have the staff capable of working on interrelated issues and with all related institutions.

I am not taking exception to the speaker's contention that some planners should work on the staff of the air quality control agency. This is necessary to insure good cooperation and understanding with the land use agency, and is also needed for the development of preliminary studies and implementation details. However, it would be very damaging if this group of planners tried to perform the land use agency role.

The relationship between land use legislation and environmental legislation deserves comment. I agree with the speaker that it will be beneficial to pass national land use legislation, which will help to integrate the activities affecting land use. However, legislation has existed for many years allowing HUD to support local and state land use planning. This legislation, which is already available, can, through good professional effort, assure adequate coordination between specialized environmental fields such as air, and other aspects of the human environment. The funds from HUD block grants and planning grants to local governments can be used for planning coordination and studies conducted to foster environmental quality.

The need for integration between land use and the environment has always been clear. Some environmental elements were included in the considerations of land use planning (although in the intuitive or qualitative form) since its beginnings. After all, in Garden City, 1898, Ebenezer Howard was locating residential use in clean air areas and separating them from industry, considering wind direction and diffusion of emissions. Therefore, professional planners are delighted that we are now able to approach air quality in a more systematic and quantitative way.

I doubt if we can say that the Clean Air Act has clean air as the only objective. Section 101(b)(1) describing the purpose of the Act adds: " . . . to promote the public health and welfare and the productive capacity of its (nation) population." We can clean the air one place or another, earlier or later, with a large or a small resources expenditure, but the proper answer as to why, where, when, and how involves the entire comprehensive land use planning process. I agree that clean air should not be used as a clout for social or racial issues, it should not be abusing in the sense of implementing objectives contrary to community goals. However, many other management and design activities usually do serve several functions. For example, in a well designed building the same element may have a structural role, facilitate mechanical systems, serve as a partition, as a decorative shape, acoustical buffer, and so on. A building ac-claimed in the city will never only serve to shelter people, it will have an economic function, will frame street life, bring aesthetic and touristic values to the city, help open space arrangements, air flow, and so on. We can say that the Clean Air Act authority "must" be conscientiously used to implement other legitimate objectives, usually expressed in the policies of the comprehensive land use plan. In this highly political process, we have to use any related resources which at a particular time can help—persuasion, education, direct or indirect regulation—whatever is legal and leads to a better life in any community.

I totally agree with the speaker that the unexpended development capacity contained in approved zoning represents a very serious problem. In the past, very seldom was assigned zoning in central areas of the towns and cities related quantitatively to the capacity of utilities, services, or environmental systems. Even the partial uses of the development capacity of existing zoning often creates congestion, and full use of zoned development capacity would probably strangle cities entirely. This clearly needs to be studied and is worthy of an interagency coordinated effort. It is not fair nor judicious to leave the entire fight to air and sewer programs, since serious social, economic, technological, and political issues must be resolved.

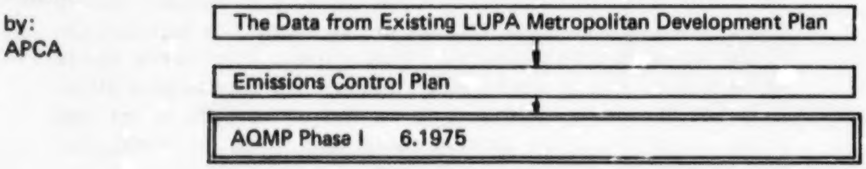
I have attached two formats for an AQMA Plan development process. The first has limited involvement of the land use planning agency, and can result in irrational decisions when viewed from a non-air quality perspective. The second, where air quality planning is deeply integrated with the land use planning process, will usually lead to rational decisions, high productivity, and high environmental and social benefits.

C.S. 11.10.74

AQMA PLAN DEVELOPMENT PROCESS with limited involvement in land use planning process -- (usually inadequate).

Legend:
APCA – Air Pollution Control Agency
LUPA – Land Use Planning Agency
TPA – Transportation Planning Agency

Phase I.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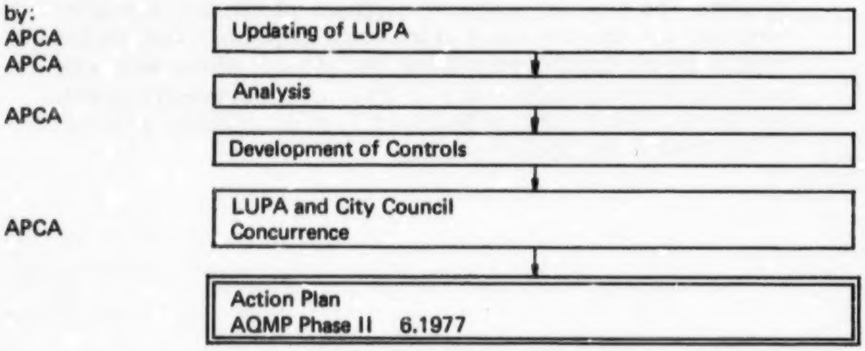
APCA
The Data from Existing LUPA Metropolitan Development Plan
Emissions Control Plan
AQMP Phase I 6.1975

Phase II.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APCA
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Updating of LUPA
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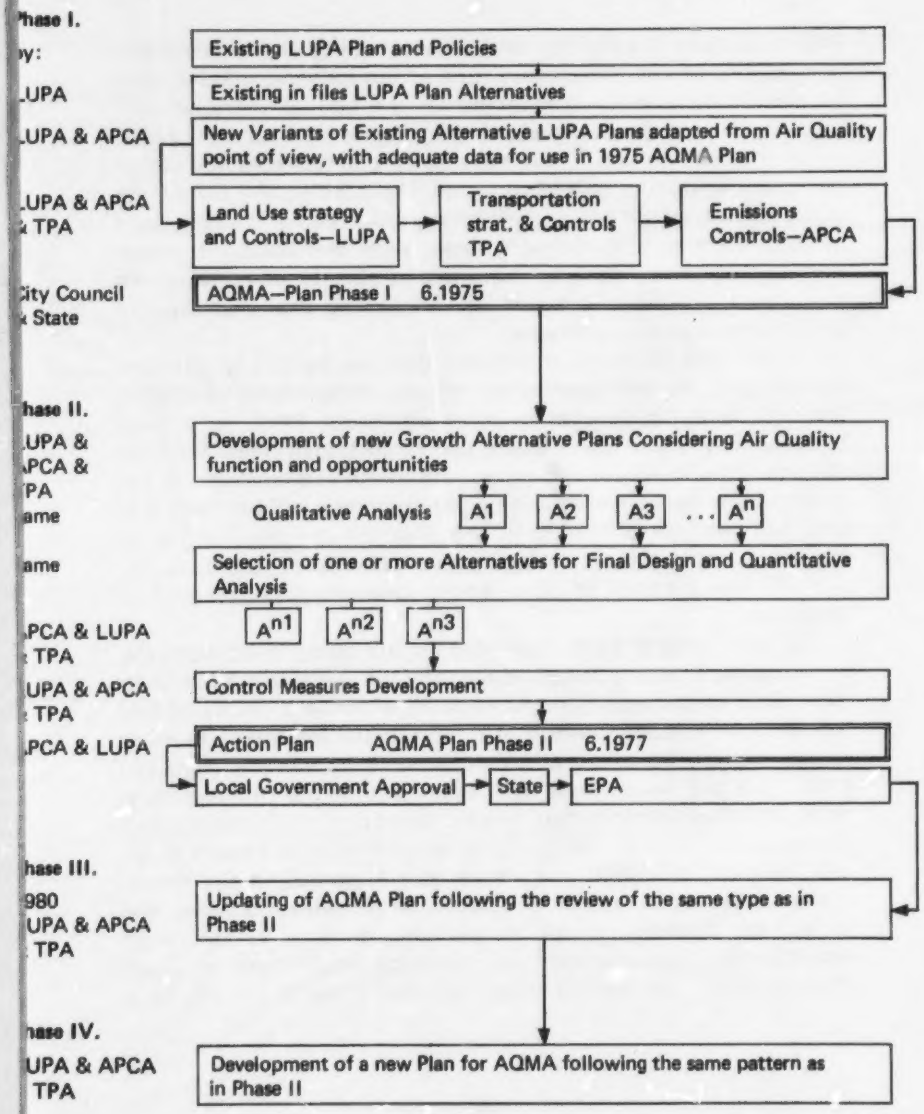
AQMA PLAN DEVELOPMENT PROCESS – Integrated with land use planning process – (usually satisfactory).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New Variants of Existing Alternative LUPA Plans adapted from Air Quality point of view, with adequate data for use in 1975 AQMA Plan
Land Use strategy and Controls–LUPA
Transportation strat. & Controls TPA
Emissions Controls–APCA
AQMA–Plan Phase I 6.1975
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Development of new Growth Alternative Plans Considering Air Quality function and opportunities
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Selection of one or more Alternatives for Final Design and Quantitative Analysis
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Control Measures Development
Action Plan AQMA Plan Phase II 6.1977
Local Government Approval
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EPA
hase III.
980
UPA & APCA
TPA
Updating of AQMA Plan following the review of the same type as in Phase II
hase IV.
UPA & APCA
TPA
Development of a new Plan for AQMA following the same pattern as in Phase II

Comments

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McLean, Virginia

This has been a long day and a lot of things have been discussed, but I think the primary tone of the meeting reflects what we should have done in planning for the last 20 years and not what we should be doing about planning for the next 20 years.

In the last 20 years, we have seen considerable growth of our street system in suburban areas of our cities; we have seen some freeways built which have increased speed and which have increased travel in our urban areas. With this improved transportation network, cheaper land, and a surplus of housing, we have seen economic colonization developing that has brought on a series of social problems.

In the next 20 years, it appears that the pattern is going to be different. We will spend little on our transportation systems. We will be trying to operate more effectively what we have—building only a few roads and a few rapid transit lines. We may not see anywhere near the same gain in the real income we enjoyed in the last 20 years. Single-family homes will be limited to very few because of their high cost. We will see the filling in of our urban fabric, with multi-family dwelling units of various types. We will see a series of other social changes that are hard to anticipate.

But one thing is quite clear—we are not going to increase the transportation supply substantially, and we are going to have to learn how to manage the system more effectively. Some of this will be done through controls and preferential treatment. In other cases, we will be trying to affect demand by various disincentives. This will be done at two levels, one at the regional level with organizations like Paul Watt's Metropolitan Transportation Commission. Then we will see it on a subarea level around shopping centers, industrial complexes, and large residential tracts. Plans for the region will be developed on a continuing basis, and in fact will become part of the planning process. In fact, such management plans will become a Federal requirement to obtain Federal funds. As part of these regional plans there will be a series of subarea studies which will take several years to carry out.

This is a whole new approach. Our techniques in the past were aimed at telling where new facilities should be built and their size. We have not been faced with how we can affect demands to keep them in line with supply. We also have not really effectively considered many of the environmental issues, as well as energy issues, in our planning. New techniques will have to be developed which consider air, energy, and land development impacts much more than we have in the past.

Certainly in line with what David Hawkins indicated,[1] this planning process will have to be open. Citizen and political leaders will have to be more involved. We will find ourselves, because of this citizen involvement, going through several iterations in the planning process. We will have to develop new coordinating mechanisms to bring the political leaders and the citizens in, and to bring into effect the various agencies that are involved. The Boston Transportation Planning Review, which has been cited here several times, may be a kind of model for a planning process of the future.

Citizens were involved in the study design, development of alternatives, and evaluation. They were involved, along with the political leaders, in the trade-off analyses that Mr. Einsweiler talked about. One thing that is quite evident with citizen and political involvement is that there are going to be trade-offs made. Questions of air pollution will be weighed with other factors—social and economic. I think this is quite clear if we look at the Interstate Program, recognizing that it was primarily instituted to accomplish one goal, meeting traffic demands for 1980. When the system got underway it became quite apparent that this goal had to be weighed with social and economic factors, and that if it did not the freeways were going to be stopped by the citizens and political leaders.

I think that the air pollution programs will go through the same review and will have to be weighted by other criteria before they are finally adopted. I think, however, that overall there is going to be a great deal of support for many of the air pollution programs because these programs tie in well with other objectives, objectives of strengthening the downtown area or saving energy. Certainly a lot of support will be obtained from such objectives. The traffic engineer in Seattle was supporting the air pollution program primarily because it supported the objectives of the City for strengthening downtown.

I think we will see air pollution become part of an integrated planning process such as was recently carried out in the central area of Gothenberg, Sweden. There, various alternative traffic solutions and environmental solutions were evaluated, and a program of street closings, traffic controls, and preferential treatment of bus service was established, which greatly improved the environment of the central area, reducing noise as well as air pollution. This was done after a lot of hard work by an interdisciplinary team looking at lots of alternatives and trying to determine what was best suited to central Gothenberg. The key was a thorough evaluation of alternatives from many points of view.

I think that Bill Owen in his new book, **The Accessible City,** has stated the direction of our planning efforts in the next 20 years when he said that we have to plan, design, and operate our cities to improve livability and not mobility.

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[1] Mr. Hawkins presented comments on the paper by Mr. Watt and Mr. Hoffman, but these comments were unavailable for inclusion in this volume.

Session III
The Regional Air Quality Management Program

Chairman:

**Leigh Hammond, Center for Urban Affairs
& Community Service,
North Carolina State University,
Raleigh**

Federal, State, and Local Air Quality Management Programs: Transportation and Land Use Implications

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Office of Air Quality Planning and Standards
Office of Air and Waste Management
Environmental Protection Agency
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HISTORY OF AIR POLLUTION CONTROL

One might get the impression, from the current tempo of activity and debate, that air pollution control is a new concern of man. The fact is that it is not. Man's efforts to control his air environment began at least 700 years ago. Just in the recent history of industrialized and urbanized society, over the last 100 years, there have been five generations of these efforts, with three occurring in the last 30 years. And it now appears that we are in the dawn of the sixth generation of pollution control.

In the latter part of the 19th century, as industrialization moved on apace, many governments sought to eliminate public nuisances through regulations on the location and performance of the offensive trades. While some progress may have been made, it is clear that even that limited problem was not solved. Technology, public attitudes, and law enforcement were not prepared to take the steps needed to succeed.

The second generation in air pollution control began about 1900 and extended to 1941. In this phase, the evils of black smoke from burning of bituminous coal were combatted with smoke abatement ordinances and schools to teach people how to properly operate coal fired equipment, including furnaces of all kinds and railroad locomotives. There were no air quality goals except a general desire to reduce the pall of smoke over many cities of the country. People who could afford it employed personal measures to solve the problem—they moved out of

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town. The programs did not work, as evidenced by the heavy black curtains of smoke and soot that hung over such cities as Pittsburgh, St. Louis, Chicago, Cincinnati, etc., in the 1930's and '40's. The country was not willing to change from bituminous coal to cleaner fuels. The general public may have been, but the power structures in the communities were not.

The third generation in air pollution control began in St. Louis. On a day in 1940, the smoke was so thick that visibility was reduced to near zero. The public outcry was loud enough that the Board of Aldermen finally adopted an ordinance, which some authorities had long advocated, prohibiting the use of high volatile bituminous coal except in mechanically fired furnaces. The bituminous coal interests were enraged. But an aggressive enforcement program to implement that law and to stop dense smoke, backed by the citizens and a public-minded mayor, put the concept into effect. Low volatile coal, coke, oil, and gas replaced the high volatile coal and thousands of stokers were purchased. Diesel engines replaced coal-fired locomotives and in a few years, vast improvements in smoke levels occurred. The program was copied by many other cities. Again, there were no specific air quality goals and no planning to prevent future problems. Little or no attention was given to invisible pollutants.

In the late 1940's, a fourth generation in air pollution control began. It started in Los Angeles when photochemical smog was identified. The problem was not due to coal smoke, but rather to motor vehicle pollution and emissions of various pollutants from a vast array of sources. The people of southern California were accustomed to clean air and, after many hard fights with petroleum interests, industry in general, and the automobile companies, mounted programs to control all commonly occurring air pollutants from most sources. The program was copied to a greater or lesser extent by many cities. But again, there were no well defined air quality goals and little was done to evaluate future conditions and to make plans and take actions to prevent future problems. While a great deal of pollutant emission control was accomplished, the programs were generally not able to break even because of continuing growth and urbanization and the explosive expansion of energy use and travel via the personal automobile in the post-1945 period.

The present generation of air pollution control began in the late 1960's, fostered in large measure by problems and control programs in California and revisions to the Federal air pollution control laws. It was supported by an expanding body of scientific knowledge about the adverse effects of air pollution on public health and a willingness to establish air quality goals (standards) based on that knowledge. A few forward-thinking political officials, scientists, and physicians sounded the alarm and alerted and informed the public. Air quality standards were adopted and emission control programs were designed to achieve those standards. Some crude beginnings were made to integrate air quality considerations into general community plans. State and local governments, some at the urging of the Federal government, created and expanded air pollution control programs at a rapid rate. Personnel were added to research and investigation programs. As a result, the country now has a pretty good idea about the kind of air it needs to have and how it can be achieved. Much progress has been made. But our public policy and our institutions are still not well equipped to decide what our communities should be in the future, nor how attainment of any goals that might be set can be assured. Air quality goals are included in this unfortunate set of circumstances. It appears that the nation may be on the brink of making serious efforts to plan its future and to effectively prevent the creation of more unsatisfactory community situations, as the nation adds some 50,000,000 more people to its cities over the next 30 years. Therein lies the sixth generation of air pollution control—the integration of air quality considerations into environmentally satisfactory comprehensive community plans **and** the establishment of laws, institutions, and programs to make the plans materialize.

PRESENT AIR RESOURCE MANAGEMENT PROGRAMS

Most of the state and local governmental air pollution control programs today are molded to reflect the requirements of the Federal Clean Air Act of 1970. That Act prescribes, in considerable detail, how the air pollution problem is to be approached. The basic foundation of the national program is the ambient air quality standards established by the Federal government. They apply everywhere, although state and local governments may (and some have) set more stringent standards. These standards set the firm goals that all other activities, in one way or another, are designed to support. The other key element of the Act is a requirement that all states must develop and implement plans to achieve and maintain the air quality standards by a specific date, generally mid-1975 (but in some cases 1977). If the states fail to act, the Federal government is obliged to do so. Air quality standards have been promulgated (in 1971) for commonly occurring pollutants and most states have adopted (in 1972) plans and enforceable regulations to achieve the air quality standards. The U.S. Environmental Protection Agency (EPA) promulgated regulations for some states which failed to adopt adequate plans and regulations.

The present State Implementation Plans (SIPs) were based on air quality and pollutant emissions which existed in 1970 and 1971. Future growth through about 1975 was considered. As originally submitted, the control strategies consisted almost entirely of measures to reduce emissions from sources. Very little was done in terms of measures related to transportation and land use controls.

Nearly all plans include procedures for review, prior to construction, of new stationary sources. If a proposed source is expected to exceed emission limitations or to cause a violation of ambient air quality standards, its construction is to be prevented. Most agencies enforce the emission limitation feature pretty well, but construction at a particular location is rarely denied because air quality standards would be exceeded, even though in many areas the standards are already exceeded and, in many cases, will continue to be so. Thus, locational control at present is not widely implemented, in fact. Emission standards for new sources are generally those adopted by the individual state and local governments and thus, considerable variation occurs and may be a small factor in locational decisions. However, EPA has promulgated standards for several kinds of major sources and will be doing so for more. These standards are uniform throughout the nation and override any less stringent state or local regulation. Thus, for these classes of sources, emission limitation variation from one area to another is not a factor in deciding upon the location for a new source. Such sources may, however, encounter locational restrictions because of the prohibition on causing air quality standards to be violated. This may tend to inhibit location of new major sources in polluted (usually urban) areas.

Subsequent to approval by EPA of the SIPs (and promulgation of regulations by EPA, where states failed) court actions were taken to force the states and EPA to make greater efforts to achieve ambient air quality standards by the time prescribed in the Federal law (generally 1975 but possibly 1977). It was shown that the Federal program for control of new motor vehicles, along with the state and local programs for control of stationary sources, would not be adequate. The court determined that the cities and states should have made greater use of transportation and land use controls to help achieve the standards at the earliest practicable time. As a result, in 32 air quality control regions where pollution by carbon monoxide or photochemical oxidants was a problem, various measures to reduce pollution from transportation sources were adopted by the states or promulgated by EPA. The measures employed included the following:

1. Vehicle emission inspection and engine maintenance
2. Retrofit of pollution control systems on pre-controlled (by the Federal new car pollution control program) vehicles
3. Use of gaseous fuels instead of gasoline
4. Traffic flow improvements
5. Parking restrictions
6. Mass transit improvements
7. Promotion of carpools
8. Increased provision of bicycle lanes
9. Exclusive bus and carpool lanes
10. Mass transit and carpool incentive provided by employers to employees
11. Gasoline sales limitations
12. Parking supply management plans

Some of these actions have created a great deal of public opposition because they increase travel costs, cause inconvenience, or threaten to decrease business because of parking or travel restrictions or costs. Other measures have been fairly well accepted. While these measures will help solve air pollution problems, they do not get at one of the basic problems in urban centers, namely, the great amount of travel that is done. Approaches to this facet of the problem hinge more upon land use planning and control. It is, in a way, unfortunate that the air pollution control effort is bearing the brunt of public opposition to a change, which even though unpopular is generally deemed necessary, namely to reduce the use of personal vehicles and increase the use of mass transit.

Another court suit was filed which sought to require incorporation in the SIPs a way to prevent construction of facilities which would increase motor vehicle travel to the extent that air quality standards might be violated. Such facilities are called "indirect sources" and include shopping centers, sports stadiums, airports, roads, recreation centers, etc. The result of this court case was a Federal requirement that all SIPs contain procedures for review, prior to construction, of such indirect sources and the power to prevent construction if air quality standards would be exceeded because of motor vehicle travel associated with the indirect source. Nearly no SIP contained such measures and thus EPA promulgated regulations applicable in most states. There was great opposition to these regulations. It was feared that air pollution considerations would become too strong a factor in determining whether a proposed indirect source could be built in a particular location. This was the assertion, even though such facilities must already secure a great number of permits for a variety of purposes. It was also felt that the regulations might prevent large new facilities because they would cause air quality standards to be exceeded, or to be exceeded to a greater degree in the many areas where standards are presently exceeded. It was said that if large facilities were prevented, numerous smaller facilities might be built instead and thus cause more vehicular travel and poor land use patterns. It is anticipated, however, that it will be possible to build most facilities anywhere they are needed, so long as good free-flowing traffic patterns are provided for. But in some cases, it may be necessary to find a new location for a proposed facility. Thus, the indirect source review regulation takes on some of the features of a zoning or land use control measure. This raised concern among local governments which feared that locational controls, which have long been their prerogative, were being taken over by the state or Federal government.

The Federal Aid Highway Act contains a provision which requires that all highways built with Federal aid funds be consistent with the approved plan for implementation of ambient air quality standards (Title 23 USC Sec. 109 (j)). In connection with this requirement, state air pollution control agencies are now supposed to review comprehensive transportation plans and determine whether such plan is consistent with the SIP. If a finding of non-consistency is made, the plans are to be revised. This program is just getting underway and policies, procedures, and outcomes are still evolving. The procedure does appear to be a step forward in trying to integrate various community goals and programs. However, problems may arise since the transportation plan is designed to serve some expected land use and the procedure does not include direct ways to influence the basic land use plans or developments. The greatest merit in the procedure is, perhaps, the opportunity for the air pollution control agency to add its influence to that of others in getting more mass transit services into transportation plans, with corresponding lesser reliance on roads and personal automobiles.

Under provisions of the National Environmental Policy Act, an Environmental Impact Statement (EIS) must be prepared for any project using Federal funds and which may have an impact on the environment. These statements are circulated to concerned agencies through various state and regional clearinghouses, under provisions of Circular A-95 of the Federal Office of Management and Budget. The better state and local air pollution control agencies participate actively in review of EISs and exert their influence to prevent construction or cause redesign of facilities which may create undue air pollution. The procedure is not a concrete approval/disapproval scheme but only involves comment. It can, however, be a fairly effective tool. Since facility location may be an issue, the procedure does have some land use aspects.

A few communities have pollutant emission density zoning laws. These were not made part of the SIPs. Such laws, if written on the basis of sound technical evaluations and if properly enforced, could contribute significantly to air conservation purposes. While information is sparse as to how well these programs have worked, the indications are that they have not yet been particularly successful.

The SIPs are supposed to contain adequate provisions for intergovernmental cooperation. The emphasis has been on cooperation between air pollution control agencies at the state and local levels and between neighboring states. Only a few plans contain provisions for cooperation between air pollution control agencies and land use and transportation agencies. Actual cooperative activities are not often found. Surveys have revealed that the three kinds of agencies work with each other in only a few states and communities.

AIR QUALITY MAINTENANCE PLANS

The SIPs prepared by the states in late 1971 and early 1972 were primarily directed toward **attainment** of air quality standards. Only limited attention was given to how the air would be kept clean in the more distant future, once it was (and if it was) cleaned up to meet the standards. EPA is now moving ahead with a national program to address the issue of long-term maintenance of air quality standards. In some areas, where standards are not likely to be attained, the maintenance program will incorporate additional measures to result in attainment of standards.

Plans and programs providing for the maintenance of ambient air quality standards in the 1975-85 time period will involve evaluation of the air quality implications of future land use development, pollutant source emissions, and transportation patterns. Once this evaluation is made, it will be necessary to develop an enforceable plan to insure that air quality standards are maintained (or attained **and** maintained). The program for future air resource management may involve additional measures to reduce emissions from individual sources; measures to cause future growth and development to follow specified patterns which have been determined to be consistent with maintenance of air quality standards; and measures to insure that changes in community activity patterns which are needed to maintain standards do, in fact, occur. Among the measures likely to be considered are the following:

1. More stringent emission control regulations
2. New source performance standards (both in regard to emissions and impact on air quality)
3. Changes in types of energy used (coal, oil, gas, electricity)
4. Phase-out of certain kinds of sources
5. Prohibition of certain kinds of new sources
6. Energy conservation requirements
7. Fostering of district heating plants

8. Total community emission ceilings and allocation of shares of such total
9. Modification of future community development plans to be consistent with maintenance of air quality standards (land use and transportation plans)
10. Measures to prevent development which is not consistent with an environmentally satisfactory community development plan
11. Transportation controls and parking management measures (listed above)
12. Emission density zoning
13. Emission charges or taxes
14. Programming of public improvements in patterns consistent with maintenance of air quality standards
15. Constraints on location of major pollution sources

Over the past several months, EPA, with the aid of contractors and widespread consultation, has developed a broad array of technical information to facilitate the analysis of future pollution situations and the design of programs to assure maintenance of air quality standards. Guideline documents have been and will be published. Shortly, EPA will issue regulations which will spell out the requirements which states are to meet in the development of their plans to assure maintenance of standards. These plans will be, in essence, revisions and extensions of the existing SIPs. The states are to submit their plans by June 1975 but, in view of the magnitude and complexity of the work to be done in some areas, provision will be made for a two-phase approach. In the two-phase approach, relatively simple parts of the plan will be submitted to EPA by the states in June 1975, which partial plan would assure maintenance of standards through 1978. Along with this partial plan, the state would submit a work plan which the state would follow in developing a full and complete plan to be submitted in June 1977.

It is recognized that state and local governments are facing many difficult problems in the development of maintenance plans. New concepts and approaches are involved and the plans may well include new kinds of measures which will impinge on traditional community living patterns and existing institutional arrangements. The job will be tough. But people and agencies concerned about air pollution will not be alone in these efforts to re-shape the cities of the nation. Many others are working in the same general field. Great efforts will be necessary to coordinate the policies and work of these various specialized interest groups (e.g., transportation and land use planners; economic development groups; water pollution control, noise control, and other environmental aspects, etc.)

RELATIONSHIPS BETWEEN AIR RESOURCE MANAGEMENT AND TRANSPORTATION AND LAND USE

There is growing acceptance of the concept that the air over a given parcel of land can assimilate only a limited amount of air contaminants without causing air quality standards to be exceeded. The particular amount depends on meteorological and topographical influences on atmospheric circulation and the geographical distribution of pollutant sources within a region. When this fact is recognized, it becomes clear that if a community is to meet its air quality goals, it must strike a balance between the number of sources, the emissions per source, and the location of sources. Development of such a balance clearly calls for land development plans and controls that will be compatible with the overall community development plans and patterns and air quality goals. A full discussion of this relationship cannot be presented here, but a few key elements can be mentioned, as follows:

1. Future land use and transportation plans must be evaluated with respect to their air quality implications.
2. Various possible urban forms should be evaluated to enable selection of the future development plan which will best serve community goals, including attainment and maintenance of air quality standards.
3. Transportation plans associated with land use plans should be designed to be consistent with attainment and maintenance of air quality standards.
4. A balance must be struck between high and low density land development, transportation needs, and pollutant emission rates from individual sources.
5. A balance must be struck between air quality considerations and other factors (natural attributes of land, labor

supply, travel time, shipping costs, etc.) in location of major pollution sources.

6. Ways must be found to make the well laid plans for air quality agencies, land use planners, and others actually come to pass.

SOME DIFFICULT ISSUES

Agencies concerned with attainment and maintenance of air quality standards share many of the same problems as those concerned with urban planning and development, social progress, economic development, community government, etc. Air pollution control agencies in the past have tended to operate pretty much in their own realm, namely, to reduce pollutant emissions from sources. But now, and increasingly so in the future, the air quality control agency will have to integrate and coordinate its activities and plans with those of others. Some of the more difficult issues confronting air quality control agencies, and other agencies, in the years ahead are briefly discussed in the following paragraphs.

1. What institutions shall decide upon the future characteristics of our communities? Somehow, decisions need to be made as to where and how development will be allowed to occur and what the constraints on such development will be. Such decisions have a great influence on the air quality (and many other) aspects of communities. But existing institutions have been unsuccessful in determining specific community goals and in guiding development. Without major improvements in this situation, the attaintment and maintenance of air quality standards will have to rely almost exclusively on pollutant emission control—an approach that becomes more difficult and costly as needed control efficiencies approach 100 percent with the continuing growth of communities.

2. What level of government shall control land use? Traditionally, local governments, with enabling authority from their parent states, have exercised this control. But in major urban centers, with a multitude of local governments, the allowed pattern of land use development has not been conducive to attainment of air quality standards (and various other regional goals) in the most advantageous way. Regional con-

trol agencies might be an answer, but only a few have come into being and their powers are limited. Perhaps state agencies could do the job, but local governments resist the imposition of state rules on local issues.

3. How can "tough," costly control programs be "sold" when the ability to estimate future air pollution levels (and various other future matters) is as uncertain as it is? Some of the programs needed to assure maintenance of air quality standards in the future (10-20 years) will be quite costly and disturbing to established patterns of living. To gain community acceptance of such measures at this time, so they can be instituted in a phased, orderly fashion, requires confidence in the estimates of future conditions in the minds of the public and community leaders. But the technical procedures for estimating future conditions are so inaccurate that confidence is hard to build. Further perfection of estimating procedures is clearly needed.

4. How can the desire for clean air in urban centers be balanced against the desire to avoid increases in pollution levels in presently clean, non-urban areas? Urban areas now contain most of the people in the country, as well as the industry. Pollution levels are relatively high and many people are exposed. In non-urban areas, pollution levels are low and some people think they should stay that way. If new towns and new industries are located in presently clean areas, pollution will undoubtedly rise. If the new people and industries are located in or near existing urban centers, a greater degree of emission control will be needed for various sources to assure maintenance of standards. The costs of achieving such control could be very high. The nation has been struggling with this policy question of where new people and new sources should go, through the debate on deterioration of air quality, for some time and the end is not in sight. A related issue, of course, is which institution shall make the decision and what criteria (legislative or otherwise) will apply in making decisions.

5. If the concept is that the air over a given region can assimilate only a specific maximum burden of emitted air pollutants, how shall the finite total be distributed among various politi-

cal jurisdictions (or other sub-areas) and pollution source classes? Decisions on this matter will have an important impact on the nature and extent of future development, emission control costs, and transportation systems. No good way has yet been established for doing this job, nor have useful policy guidelines been suggested as to how it might best be done. A related issue, of course, is the selection of institutions and procedures for making any such distribution and means for enforcing the decisions made.

6. What kinds of laws, regulations, and incentives can be used to assure that actions needed to create a "good" community for the future will happen? There are a variety of actions which would be desirable in the interests of development of pleasant, efficient communities, and some of these impact on air quality considerations. Examples are provision of district heating plants; construction of plants to make gaseous fuels from coal; establishment of industrial and commercial facilities at particular locations; use of energy conservative building designs, etc. Present laws and regulations are generally effective in preventing private parties from doing things which are deemed to be detrimental to community interests, but the ways that are available to encourage people to do things that are good for the community are less effective. New and innovative, and possibly indirect approaches need to be designed to facilitate progress in this field.

SUMMARY

The coming generation of air resource management will be difficult. It will involve development of many new techniques, policies, and programs. The factual basis and institutional arrangements for assuring attainment and maintenance of air quality standards in the future are inadequate and in some aspects untried. The chances for error are great. But it does now seem clear that the consequences of failure to proceed will be more detrimental than would be the consequences of errors in proceeding as best we know how. If communications between all concerned are kept open, the public is informed, and farsighted actions are taken, there is hope that future air quality will be better than it was in the past. But if faint hearts prevail and procrastination persists, air quality is almost sure to deteriorate in future decades.

Comments

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I am optimistic for the future when a man as knowledgeable about the air pollution business as Mr. Schueneman is so constructive and positive in his views. He is also a most unusual cop, coming out in his sixth issue for political/institutional solutions and going beyond pollutant emission control. That is also where I come out on Issue (or Phase) Six.

To summarize the sessions thus far—we need regional approaches to air quality/land use related problems, but local governments are unwilling to support regional organizations, while the state does not always understand local needs. We need comprehensive institutions to assess trade-offs, but we are bogged down in a maze of single purpose agencies. We need renaissance men and women in a world of narrowly focused specialists. If we cannot solve these dilemmas, we can at least move in the right direction.

On the question of whether we should seek to build new regional capabilities or, alternately, whether we should assume they will never come and move the states more heavily into land use planning and trade-off assessment, I think we should do both. In some areas, such as San Francisco, where there is an inclination toward regional solutions, that approach should be emphasized and strengthened. In other areas, such as Vermont, the state is the governmental level to emphasize.

Also, I believe air pollution control should continue as a distinct, defined mission of government—this has been its strength in the past and will be in the future. But I am concerned that as air quality moves into Phase Six with AQMAs, no-significant deterioration, and indirect sources, it may be moving too much, politically, onto other people's turf—impacting transportation, energy development, and a lot more. There is a real question of how much further Phase Six air pollution control will be allowed to proceed in Congress with the likes of parking surcharges, elimination of parking spaces, retrofit on old cars, restrictions on burning coal, without changes in the Clean Air Act or limits through EPA's appropriation process.

Therefore, we must have a direct discussion and political acceptance of the costs and trade-offs of the various social choices involved. This head-on discussion of choices among air and water quality, housing, transportation, energy, employment, and recreation goals has got to come in a land use context, not in a context of air pollution control.

We can go only so far with interagency agreements between single-purpose agencies, with commenting procedures and vetos of one specific mission over another. There are major political problems, too, when air pollution control is the main enforceable land use control among state agencies and sometimes among local activities, too. Air pollution control has been strong on implementation but weak on planning, while land use has been strong on planning but weak on followthrough.

Also, air pollution control on its own, particularly with Phase Six land-related activities, has a negative tone—"Stop" and "Don't build here." What we need and what I think we all want is a positive process to say, "This is the direction and kind of growth that will meet several social objectives"—to encourage larger-scale, planned unit developments, to resolve the density/dispersal questions and establish growth determinants in an intelligent and equitable manner.

Clearly we have to build our comprehensive land use institutions. I would like to see these principles incorporated:

1. Establish the process at the lowest possible level of government. Sometimes this can be local governments, sometimes we should try to get regional solutions. With no-significant deterioration regulations, localities, even smaller towns, cannot avoid some of the tough, land use/air pollution choices, particularly when you combine this regulation with the new data coming out that show growth in the 1970's is no longer occurring in the big urban sectors, but in smaller towns. Certainly, there will need to be some redistribution of land use responsibilities. In many states I think the institutional strength should be built up in regional organizations. In others, the regions and localities may retain smaller, community-contained decisions, while the larger-sized decisions, too tough or too geographically broad for localities to handle, can be done by the state, as in Florida.
2. Insure political support for the land use process—at the establishment of that process, not after a plan is produced.

Political officials' support may mean a less "perfect" plan but, on the other hand, it may mean the process will produce more than a glossy memo to the wastebasket. This brings us to the next element,

3. A means to translate the plans into action.
4. The keystone to the system is that it must be politically responsive and acceptable and this means public participation—meaningful participation, not just the public relations, public hearing type—in drafting the plans and carrying them out. The open planning process mentioned in Sessions I and II is vital—a true understanding by people of the choices offered to them, real access to decision-makers, and significant control, political control, over the decision-makers. One of the problems of regional arrangements in the past has been that they are out of the mainstream of political life—consist of appointed officials—and are unresponsive to the public. Regional plans have not been politically responsive documents, nor the process an open or democratic one.

Ideally, regional organizations would have an elective base. There must also be an essential role for legislators—whose constitutional job it is to make basic social trade-offs and who are directly and regularly accountable to the voters. Legislature and city council votes on state and local land use plans are one way to force legislative involvement.

We have also got a communication requirement to get real public participation. People have got to know what we are talking about—we must use plain English, not just VMT, no-significant deterioration, excess deaths, PUDs, and such. We must talk to the public, not just ourselves.

Pressures for regional approaches will come when it is explained to the public out there the nature of the institutional problem—the benefits of regional land use solutions. It is not a given to everyone that regional is better; in fact, most believe regional is worse. We will have to quantify the benefits, in dollars saved, for example, to overcome the great resistance to regional approaches that have been generated by such social problems as integrated housing and schools. If we can not identify enough benefits, then we should not be able to sell regional approaches.

I definitely support passage of strong Federal and state land use laws to help create incentives to overcome resistance to planning and implementation of rational land use policies—laws with requirements to act, backed up by funds and planning assistance to overcome the woeful lack of planning expertise.

For a model in the land use field, as well as for air quality planning, we might look to the feature of the 1972 Amendments to the Federal Water Pollution Control Act, Section 208, that requires areawide waste management processes. It emphasizes implementation of regional plans and demands political commitment for local officials at the beginning and throughout the process, not just at the end. It provides requirements to act, with major impacts on construction grants and waste discharge permits if no action is taken, and then sweetens the pot with 100 percent Federal money for planning and developing regional expertise. It provides state and Federal oversight, but with essential decisions retained in the 208 regions. Of course, we do not know yet if the 208 program will be successful in overcoming existing institutional constraints, and I am told by EPA officials that as much as three-fourths of the money may be wasted because the planning may not be performed in-house, but totally contracted out without building up an institutional expertise in the regional agency. But even at that rate the expertise bought with the remaining quarter will be worth the cost.

Ideally, a regional land use plan would be developed with the support of a 208-type process. It would have as one parameter the health-based air quality standards—their attainment and maintenance. These plans would become the state's Air Quality Maintenance Plans for those areas. The role of the state would then be to coordinate local and regional AQMPs, to resolve conflicts between them, and to perform planning for those areas—mostly rural—when acquiring the planning expertise locally costs too much.

But in Virginia, as in most places, we live in a less-than-ideal world. We have regional planning commissions, eyed suspiciously by the localities they are intended to serve. Practically none has an environmental capability, being dominated by goals of transportation and economic development. Of course, Fairfax County is a notable exception. The localities retain all implementation powers and often local actions do not reflect the trade-off assessment contained in the regional land use plans. In some cases this is a good thing because the plans do not reflect the needs and wishes of local people. But only a few localities have state-approved air pollution control programs or air quality expertise.

So we are proceeding with the AQMA planning requirements and indirect source review and other new responsibilities as best we can at the state level, getting on-the-job training like everyone else and talking a lot with localities and regional planners. We are sharing with them all the expertise for air quality planning that we have available to us and seeking their guidance for those matters that we want retained locally. We at the state level, certainly in the air quality board, do not want to make local land use decisions if we can avoid it. But we will do these things that must be done to carry out our assignment of protecting air quality, if the localities refuse or cannot do it. But we find in Virginia that many localities do not refuse to tackle land use/air quality problems, they just do not know how and lack the funds. This is where EPA should come in—with stepped-up planning funds for state, local, and regional organizations, similar to the 208 program in the water field.

Also, we as a state need to know from EPA how to do AQMA planning, and how AQMAs, no-significant deterioration, existing implementation plans, and all the other pieces fit together intellectually and administratively.

I suspect that EPA does not know the answers to these problems any more than the states. I suspect that within EPA each of these programs is handled by different people. EPA seems to be using the states as "laboratories for the nation," which is quite a proper role, requiring the states to draft plans and then reviewing our methods and conclusions to see which approach is best. The only caution that is needed here, is that EPA must then allow the states the flexibility needed to experiment with Phase Six activities and when a state comes up with its own solution, not force each state into one national model. For example, in Virginia we are using an "induced traffic" approach in handling indirect sources, which is not the EPA method. We know ours is more difficult to measure, but we think it is also more clearly related to air pollution and fairer to developers. We must be allowed to follow our own approach, if the "laboratories" theory is to work.

And to close, I would like to see Federal, state, and local and regional governments think about some of the non-planning solutions to land use problems. We need to examine the tax laws—Federal income tax laws, and local property tax laws in particular—and examine building codes and other devices that provide disincentives to large-scale development, and planned unit developments.

There is just one caution as we seek to move to higher density developments. With a planned unit development, you must have the whole package, for if we get the higher densities without the accompanying mass transit, walking opportunities, and public services, we will have more air pollution and other problems than we have now. Also, we should look for ways in government to make life easier, procedurally, for the large private developer. I do not mean lessening the standards and pollution control requirements, but rather coordinating state and Federal permit procedures, the timing and measurement of permit requests, standardizing forms, and the like.

It is on this note of the "big developer" that we go on to our next discussant.

Comments

Michael Prochaska
The Taubman Company
Southfield, Michigan

INTRODUCTION

Thank you for affording me the opportunity to speak to you today. The honor is specifically important because the Taubman Company was the only developer asked to participate in the program.

The topic of Mr. Schueneman's presentation concerns all developers as well as the public service community and the scientific community. It is unfortunate that there are only a few developers here today, and I must say that I see their lack of attendance as a part of the communication problem. I only highlight this concern for communication because of our long-term commitment to sound environmental legislation. An example of the problem can be illustrated in the lobby effort currently underway to cut the funding and appropriation for implementation of parking management regulations (HR 16901). It is my opinion that this amendment is counter-productive to good environmental legislation.

It should be understood that developers are very private people and it becomes very imperative for the EPA to draw out the concerns of the developer, which I am well aware is not an easy task. Failing establishment of a good and effective working relationship, powerful lobbyists will do their best to remove both "good" and "bad" legislation. This working relationship must be constructed (that is a developer's term meaning "to build") with confidence and trust.

THE TAUBMAN COMPANY, INC.

We are regional retail developers and along with the National Realty Committee, have supported much of the current environmental legislation. The Taubman Company has offices in California, New York, and Washington, D. C., with home offices located in Southfield, Michigan.

CONFLICT AND CONFUSION

An example of the development industry concern can be shown in the indirect source regulations, which are currently being promulgated in various states and at the Federal level, having an effective date of January 1, 1975. It is possible that the following conditions can exist:

1. A Federal plan which will take effect on January 1, 1975.
2. A state plan which has been approved by the Federal government and would supersede the Federal plan.
3. A state plan approval by the state and in effect but not approved by the Federal EPA, thus requiring application under the Federal plan as well as the state plan.

It is conceivable that a developer could be 180 days into his review at the Federal level and a state plan scheduled to take effect on the 180th day, thus requiring him to begin the process over. Among the different agencies, there appears to be a draftsman or draftsperson game to see which agency can develop the most complex and confusing set of guidelines. Currently it seems as though each agency has a different set of guidelines. This is uncalled for.

REVIEW PROCESS

EPA has asked for early submission so that they (EPA) can work with the developer on review. However, the established review process is so lengthy that it places a hardship on the developer as well as a local community.

Another problem a developer must deal with is the competence of the reviewing agent. Under the theory of EPA, the indirect source permit can, if the state or local agency agrees, be reviewed by state or county officials. Many of these agencies are not technically equipped to deal with such scientific data as the relationship of air quality to traffic movement. In many of these areas, the application will then be reviewed as a land use tool which is not the intent of the Clean Air Act. Worth noting is the lack of uniformity among the different agencies regarding the application material.

LONG TERM

If the problems of the developer are not worked out, the whole environmental movement may suffer, and rightly so, if the regulations are not based on sound developer, public, and agency logic. Currently there is very little relationship between government, science, and business, and that must be corrected.

Transportation And Metropolitan Air Quality

Norman L. Cooper
Office of Environmental Affairs,
Office of the Secretary, U. S. Department of Transportation

INTRODUCTION

The basic objectives of the Clean Air Act are strongly supported by the United States Department of Transportation. In order to achieve those objectives, difficult steps must be and are being taken which have complex impacts on much of the national fabric. It is necessary to minimize the adverse effects, take full advantage of impacts which are complementary to other goals, and yet keep steadily on course toward attainment of national ambient air quality standards without undue delay. A high degree of cooperation and meshing of programs is necessary between the Department of Transportation (DOT) and the Environmental Protection Agency (EPA), and between the transportation sector and environmental protection and air pollution control agencies at all levels of government. The beginning of a cooperative relationship has been forged,[1] but much more remains to be done.

The following paragraphs will give some views on the transportation and related land use implications of EPA's air quality management activities, and will describe some of the actions being taken by DOT in support of the objectives of the Clean Air Act.

VIEWS ON AIR QUALITY MANAGEMENT

While it is not possible to speak conclusively for the "transportation sector" because of its large and diverse interests, it may be helpful to go over some of the views that have been expressed by the Department of Transportation over the last several months concerning the Clean Air Act and EPA's administration of it.

Complementary Goals

First, there is need to emphasize those elements of the Clean Air Act activities that complement other goals of the nation. Certainly those Clean Air Act activities which seem to run counter to other goals and objectives receive considerable attention. On the positive side, there are a number of goals sought by transportation programs which are complementary and possibly even synergistic with activities pursuant to the Clean Air Act. Among these is the transportation goal of attaining fair and equitable mobility for all the nation's citizens, including those without access to the automobile. To the extent that transportation control plans are encouraging better public transportation, these transportation and air quality goals are complementary.

Economic efficiency is another transportation goal. To the extent that transportation control plans encourage the development of urban transportation systems that provide the lowest cost transportation commensurate with the benefits attained, these goals are also complementary. Another goal of transportation programs is energy conservation. To the extent that Clean Air Act transportation control strategies promote lower consumption of energy, transportation and air quality goals are again complementary.

Overall, many national and international indicators make it clear that conservation of resources is essential, not only to environmental protection but to the economic well-being of the nation in a time of economic stress. By most measures, transportation control plan activities are conservation activities. Working together, it is likely that transportation programs and air quality programs will effect steady progress toward the objectives of both.

Amendments to the Clean Air Act

The Clean Air Act establishes the legal and administrative framework necessary to achieve an essential national goal. Proposed amendments to the Act must be given very careful consideration to avoid unnecessary delay in attainment of national ambient air quality standards, and to avoid other negative consequences. For example, proposals to further extend the dates for compliance with new automobile emission standards would have several negative consequences. Foremost among these would be the necessity of more stringent transportation and other controls to offset the losses in emission reductions that would be obtained by proceeding with present emission standard compliance dates.

The Department of Transportation is on record concurring with the need, as presented by EPA, to make some adjustment in the attainment dates for national ambient air quality standards in certain selected cities. Where required reductions in vehicle miles traveled (VMT) exceed any reasonable estimate of attainable increases in use of alternative transportation (e.g., transit), socioeconomic consequences would be proportionately adverse. It is here that air quality goals (i.e., VMT reductions) and transportation goals (i.e., mobility for all) would be in conflict. Present Clean Air Act State Implementation Plans call for VMT reductions exceeding 30 percent in eight metropolitan areas:[2] Los Angeles, 100 percent; San Francisco, 97 percent; Sacramento, 64 percent; northern New Jersey, 58 percent; San Diego, 50 percent; San Antonio, 40 percent; San Joaquin, 34 percent; Houston, 32 percent. (For these areas, there is need to assure that the maximum benefit from stationary source controls is being attained.) Where the goal conflict is significant-to-severe, there is need for revision of the statutory attainment date for ambient air quality standards for those areas.

While a blanket postponement of attainment dates would not be wise, some adjustments for these cities is necessary. But the amendment should be made in a manner which continues the momentum of progress toward attainment of ambient standards. Not recommended is legislative action to preclude use of specific transportation control strategies such as parking surcharges and gasoline rationing. Strategy options should be left for administrative determination so that optimum choices can be made after analysis of all alternatives.

It is recommended that proposals for amendment to the Clean Air Act be closely coordinated with the Department of Transportation and that provisions be included in the Act to provide for consultation with DOT prior to key administrative decisions affecting transportation.

Metropolitan Governance

To the extent possible, planning and implementation of Clean Air Act transportation control strategies should be accomplished at the lowest level of government commensurate with the problem. State and local entities should be given ample flexibility to do careful analysis and selection of those strategies which will attain the standards at the greatest benefit and lowest cost with respect to other societal goals. State and local entities should be given the encouragement and support to develop strategies with adequate consideration to the dynamic processes of urban planning, metropolitan growth, and infrastructure development. Undue emphasis on a specific calendar deadline at the expense of steady and continuous attainment and maintenance of ambient air quality standards should be avoided. Strongly encouraged should be the full integration of air quality objectives, planning, analysis, and implementation with transportation, land use, and comprehensive planning at the metropolitan scale. It is the integration of these multiple programs at the metropolitan level of governance that provides considerable challenge and opportunity for achievement of multiple national, state, and local objectives.

Russell Peterson, Chairman of the President's Council on Environmental Quality, recently said that "national land use legislation is essential and should be a top priority." A de facto national land use policy has existed since the inception of Federal programs which affect land use. Unfortunately, the long list of such Federal programs (from airport aid to mortgage insurance to tax policy) often has land use consequences which conflict with each other and which are not in harmony with locally established goals for land use and metropolitan development. The land use consequences of the Clean Air Act (e.g., regulations on indirect sources, significant deterioration, and transportation control plans) are no exception. But with or without a coherent national land use policy, land use changes have definite air quality consequences and land use planning and management must necessarily be a part of strategies to attain national ambient air quality standards. Like other activities, land use decisions should be made at the lowest level of government commensurate with the problems to be solved. However, while current land use decision authority is retained almost completely at the local level, transportation and air quality are primarily problems at a metropolitan scale. Steps must be taken toward achieving land use management capability at the metropolitan level for those land use decisions which have areawide consequences.

Urban arterial highways (including freeways), rail transit systems, and major airports comprise a transportation system that must be planned and implemented on a metropolitan areawide scale and cannot be adequately addressed from a more fragmented base. For this reason, DOT governing statutes and DOT implementing activities are designed to strengthen metropolitan areawide transportation planning entities (see section on Transportation Actions Supportive of Air Quality).

Air quality problems are largely metropolitan areawide problems also—problems which cannot be analyzed adequately or given strategic planning at more fragmented levels of government. Additionally, metropolitan problems in air quality, land use, and transportation are so interdependent that they cannot be analyzed and planned separately with effectiveness. For these reasons, it is essential that air quality institutional capability be encouraged and enhanced at the metropolitan level and fully integrated with metropolitan transportation and land use planning.

The Environmental Protection Agency and other entities concerned with management of air quality programs should consciously work toward assignment of air quality planning responsibility to metropolitan areawide governmental entities which also have responsibility for transportation and land use planning. The objective should be to achieve metropolitan areawide agencies which have multiple program responsibility for planning the areawide metropolitan infrastructure and for assuring that environmental quality objectives are attained and maintained. Such entities should be accountable and responsive to the metropolitan area electorate and should have specific and strong ties to plan implementation.

Metropolitan institutional capability is very uneven across the nation. Secretary of Transportation Claude Brinegar has said,[3] "It is clear that some urban areas are making plans and implementing them better than others. My early analysis suggests that the better ones have agencies with at least these common characteristics: the agencies' boundaries cover the relevant urban area; its charter comes from the State and gives it, as a well-defined metropolitan unit, considerable clout; it is involved **both** in planning and implementation; and it has widespread community support, backed by an adequate staff and a first-rate top executive. These characteristics may be no guarantee of success but without them you surely run a risk of failure."

The metropolitan institutional problem is highlighted by the fact that 13 different types of Federally encouraged areawide organizations serve substate regions in various combinations to carry out 24 Federal areawide programs. In response to this problem, the Advisory Commission on Intergovernmental Relations (ACIR)[4] has recommended[5] enactment of legislation to consolidate all substate Federal areawide planning requirements in umbrella multi-jurisdictional organizations officially designated by the State and/or its localities, or, when both fail to act, by the Office of Management and Budget.

There has been substantial movement in the direction of the ACIR recommendation: regional councils of government with A-95 review authority exist in at least 212 of the 278 metropolitan areas over 50,000 population. Half of the regional councils are the preferred unit for from four to nine of the Federally encouraged areawide programs. The Metropolitan Council in Minnesota's Twin Cities area and the Atlanta Regional Council, along with 5-10 percent of other councils, already possess many or most of the functions recommended for consolidation by ACIR.

Although achieving the needed metropolitan institutional capability will not come quickly, there are steps that can be taken now to move more surely toward that objective for air quality. One step might be appropriate amendments to the Clean Air Act which, while retaining primary state responsibility for attainment of ambient standards, would call on the states to designate and support multiple-program metropolitan areawide planning including air quality. This step is consistent with legislation governing transportation programs. For example, while the Federal-Aid Highway Act provides funds and programs to the states, included in this statute[6] is the requirement that programs in urban areas over 50,000 population shall not be approved unless they are based on a comprehensive areawide transportation planning process. There is also provision in this statute[7] for passthrough of areawide planning funds to these metropolitan entities. Another step is through the regulations promulgated by EPA to implement various aspects of the Clean Air Act. These regulations could include language to encourage states to designate and support metropolitan areawide air quality planning which is integrated with other planning and tied to implementation. A third step is to continually provide needed technical assistance from Federal and state air quality organizations to metropolitan institutions.

Transportation Control Plans

As part of Clean Air Act State Implementation Plans, the states have prepared and EPA has approved and/or promulgated transportation control plans for the 28 metropolitan areas which must have transportation strategies to attain ambient air quality standards by the prescribed dates. These transportation control plans will necessarily have to be revised and updated as new information becomes available and as amendments are made to the Clean Air Act and to other legislation which affect the use and timing of the strategies. These plans and the revisions thereto should be initiated and prepared by the states and preferably by their metropolitan areawide entities with a goal of reducing to the extent possible the necessity for revision and promulgation by EPA. All feasible steps should be taken to assure a systematic effort to analyze all available alternative strategies prior to amendment and promulgation of transportation control plans. On this point, maximum freedom should be given to metropolitan entities to choose those strategies which will attain ambient standards with the greatest benefit and the least cost in relation to other societal goals and objectives. These plans should reflect a dynamic rather than a static decision process whereby ambient standards are attained and maintained for not only the date prescribed for compliance, but for the foreseeable future. Longer-range strategies (such as rail transportation systems) should not be precluded purely on the basis of short-range objectives. Likewise, land use consequences and land use management should become an integral part of transportation control plan development.

DOT analysis of present transportation control plans concludes that the reductions in vehicle miles of travel that are anticipated by these plans are, in general, overly optimisic. More careful analysis must be accomplished based on the most recent and most reliable research available to make better predictions of the VMT reductions resulting from the strategies proposed. Because of cold start considerations and because of variation in vehicle performance, VMT is not always directly proportional to emissions. A more thorough analysis should focus on emission reduction, not just VMT reduction. More rigorous analyses of metropolitan areawide ambient air quality effects are needed based on the best available transportation planning models, emission models, and air quality diffusion models, in combination.

Transportation control plans might be divided into four categories: (1) strategies for reduction of emissions from in-use autos; (2) disincentives to low occupancy vehicle use; (3) incentives to high occupancy vehicle use; and (4) other strategies. Emission inspection programs and particularly emission retrofit programs on in-use vehicles require careful economic analysis in comparison with other strategies, and analysis of their incidence (e.g., which segment of the population will bear the burden of these strategies). It is clear that disincentives to low occupancy vehicle use are necessary to effect significant shifting of travel to multiple occupancy vehicles. It is recognized that disincentives to auto use, such as parking management controls, parking surcharges, and gasoline rationing, are difficult to achieve because of the political response to these programs. However, disincentives should not be discarded by legislative or administrative decision prior to thorough analysis of their effectiveness relative to other strategies.

An essential part of incentives programs is the provision of more and better public transportation, particularly buses. In a preliminary analysis of the additional buses that would be needed in the nation as a consequence of the transportation control plans for these 28 metropolitan areas, DOT analysts estimated that up to 9,000 additional buses (above present projections independent of air quality requirements) would be needed by the 1975/1977 deadlines. Assuming that these bus acquisitions, along with ancillary facilities, would be financed under the Urban Mass Transportation Capital Grant Program, the resulting additional demand on this Program through FY '77 would be approximately $465,000,000, or an average of about $155,000,000 a year for FY '75, '76, and '77. This would be added to current levels ($133,000,000 in FY '72 and $212,000,000 in FY '73). If the number of additional transit passengers used in calculating bus requirements were carried at the present average deficit per passenger (13¢), the resulting annual operating deficit for the 28 urban areas would be $45,000,000. Obviously, funding for transit is a major problem in achieving these strategies and additional funding sources are necessary.

Promotion of carpooling is another essential incentive strategy. In the "other strategies" category, staggered working hours, staggered working days, and a staggered 4-day work week can be an effective and extremely low cost (financial, if not institutional) means to reduce total emissions, provided they are not offset by increase in non-work travel. For example, in Seattle, it has been estimated that bus capacity could be increased by 11,000 passengers for every hour of staggering.[8] For Washington, D. C., it was estimated that a one hour extension of morning and evening rush hours would permit the metropolitan bus system to expand bus passenger capacity by 60 percent.[9]

Research

There are multiple areas where the knowledge and data needed to carry out a regional air quality management program are very limited or non-existent. The following need special emphasis: (1) there is need for diffusion models which would enable transportation and air quality analysts to evaluate the reactive pollutant consequences of alternative strategies; (2) there is need for better understanding of the air quality consequences of urban growth and changes in metropolitan area land use patterns; (3) there is need for better knowledge of the elasticity of disincentives to low occupancy vehicle use such as parking surcharges; (4) there is need for before and after monitoring, analysis, and reporting of the implementation of transportation control strategies; and (5) there is need for demonstration programs to test the consequences of particular strategies.

TRANSPORTATION ACTIONS SUPPORTIVE OF AIR QUALITY

There are a number of programs and activities sponsored or carried out by the Department of Transportation which are supportive of the objectives of the Clean Air Act and of regional air quality management programs. These DOT actions and programs include the Metropolitan Transportation Planning Process, various elements of the Federal-Aid Highway Program, virtually all of the Urban Mass Transportation Program, programs to encourage carpool activity, automotive and aircraft emission control programs, and a DOT research program related to air quality management.

Metropolitan Transportation Planning

As a prerequisite to Federal transportation grants, a continuing, cooperative, and comprehensive (i.e., 3C) transportation planning process must be in effect in each urban area of over 50,000 population. The highway element of this planning program is the oldest of all Federally sponsored planning programs. The statewide highway planning program was established in 1934,[10] and for urban areas the most significant milestone is the Federal-Aid Highway Act of 1962.[11] This Act specified planning requirements for urban areas as a condition for use of Federal-aid highway construction funds. A comprehensive and cooperative planning process has been developed in all 278 of the nation's urbanized areas of over 50,000 in population. DOT carries out a comprehensive review of planning activities in these urban areas. Both the technical activities and the institutional framework of planning and decision-making are included in the DOT evaluation, including the relationship of this planning program to other planning programs in the same urban area and now, including the relationship to air quality management. The 1973 Highway Act earmarks urban planning funds (1/2 percent of Federal-aid funds) and requires that these funds be made available to metropolitan planning organizations designated by the states. Federal funding for highway system planning, urban and state-wide, was approximately $35 million in fiscal year 1973.

With enactment of the Urban Mass Transportation Act[12] in 1964, Federal assistance to mass transit was made available to those projects which will carry out a program for a unified urban transportation system as part of comprehensively planned urban area development. Approximately $9 million of DOT mass transit technical studies funds were granted in fiscal year 1973 for purposes of system planning.

The Airport and Airways Development Act of 1970[13] provided for an airport planning grant program for the first time by the Federal government. Areawide planning agencies are eligible to be recipients of system planning grants, thereby encouraging states and metropolitan areas to consider total airport needs in relation to land use and environmental quality. In fiscal year 1973 the airport systems planning grants totaled $3.1 million. The Airport Act also limits airport development project approval to those projects which are consistent with plans for areawide development.

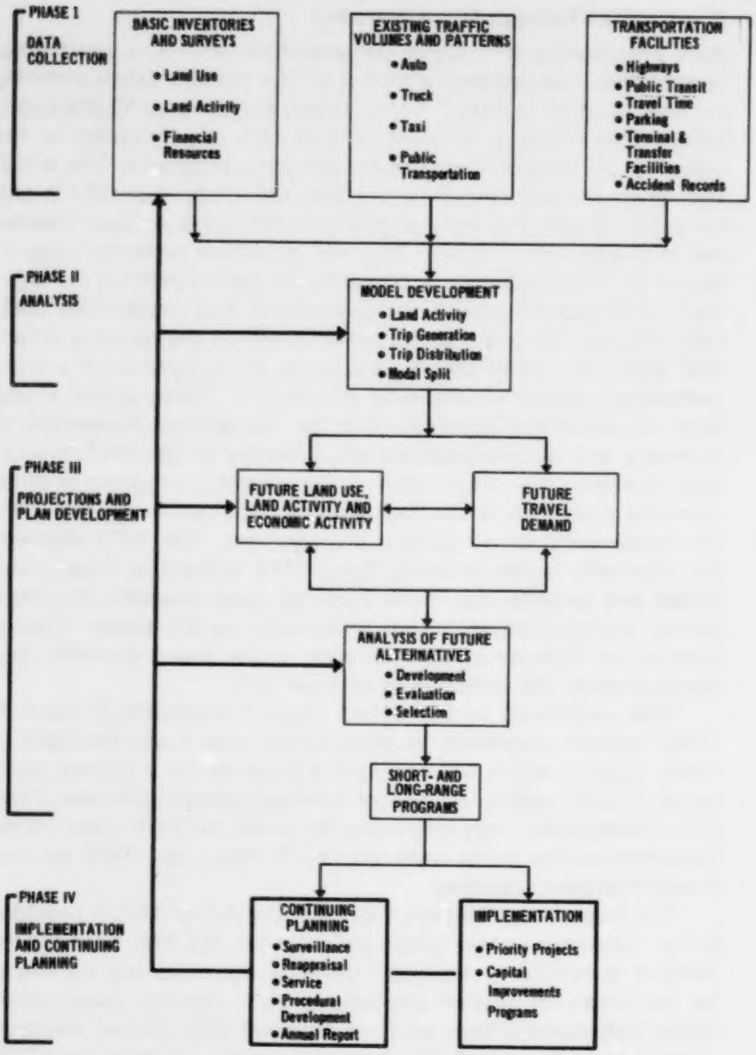
PHASE I
DATA COLLECTION
BASIC INVENTORIES AND SURVEYS
• Land Use
• Land Activity
• Financial Resources
EXISTING TRAFFIC VOLUMES AND PATTERNS
• Auto
• Truck
• Taxi
• Public Transportation
TRANSPORTATION FACILITIES
• Highways
• Public Transit
• Travel Time
• Parking
• Terminal & Transfer Facilities
• Accident Records
PHASE II
ANALYSIS
MODEL DEVELOPMENT
• Land Activity
• Trip Generation
• Trip Distribution
• Modal Split
PHASE III
PROJECTIONS AND PLAN DEVELOPMENT
FUTURE LAND USE, LAND ACTIVITY AND ECONOMIC ACTIVITY
FUTURE TRAVEL DEMAND
ANALYSIS OF FUTURE ALTERNATIVES
• Development
• Evaluation
• Selection
SHORT- AND LONG-RANGE PROGRAMS
PHASE IV
IMPLEMENTATION AND CONTINUING PLANNING
CONTINUING PLANNING
• Surveillance
• Reappraisal
• Service
• Procedural Development
• Annual Report
IMPLEMENTATION
• Priority Projects
• Capital Improvements Programs

Figure 1: Transportation Planning Process

DOT has worked toward insuring that planning performed under the auspices of these three planning programs is coordinated and complementary. To this end, transportation planning in metropolitan areas is performed or coordinated by a single agency according to a single locally developed DOT-approved "unified work program" which incorporates all transportation planning and related activities regardless of sponsor and funding.[14] Federal coordination has been enhanced by the creation of intermodal planning groups (IPGs) in the field at the Federal regional level. In addition to the modal administrations (FHWA, UMTA, and FAA) the IPGs often include the Department of Housing and Urban Development (HUD) and the Environmental Protection Agency. In addition, a single DOT certification process[15] applies to FHWA and UMTA modal programs with sanctions on capital expenditures to be applied if a metropolitan area planning process does not measure up.

Coordination with air quality management through the transportation planning process is also strengthened by the A-95 areawide review requirements[16] and by the HUD comprehensive planning assistance programs.[17] Together these requirements encourage integration of land use and environmental planning with transportation planning for metropolitan areas. At least 20 metropolitan areas have initiated transportation and land use planning under a single DOT/HUD work program.

The process used in individual urban areas and the degree of sophistication of this process varies depending on the length of time the planning process has been developing for the area and depending on the financing and size of the staff carrying out the process. However, Federal review requirements, certification requirements, and review of the unified work program, cause a certain level of minimum standards to be in effect in all of the 278 urban areas over 50,000 population. Nearly all of these include evaluations of existing and future economic, population, and land use data; estimates of future demands for all modes of private and public transportation; inventories and analyses of existing transportation facilities; the development of a comprehensive transportation plan; and the implementation of a continuing program to monitor and, as necessary, to revise the original transportation plan. Figure 1 outlines a typical metropolitan transportation planning process.

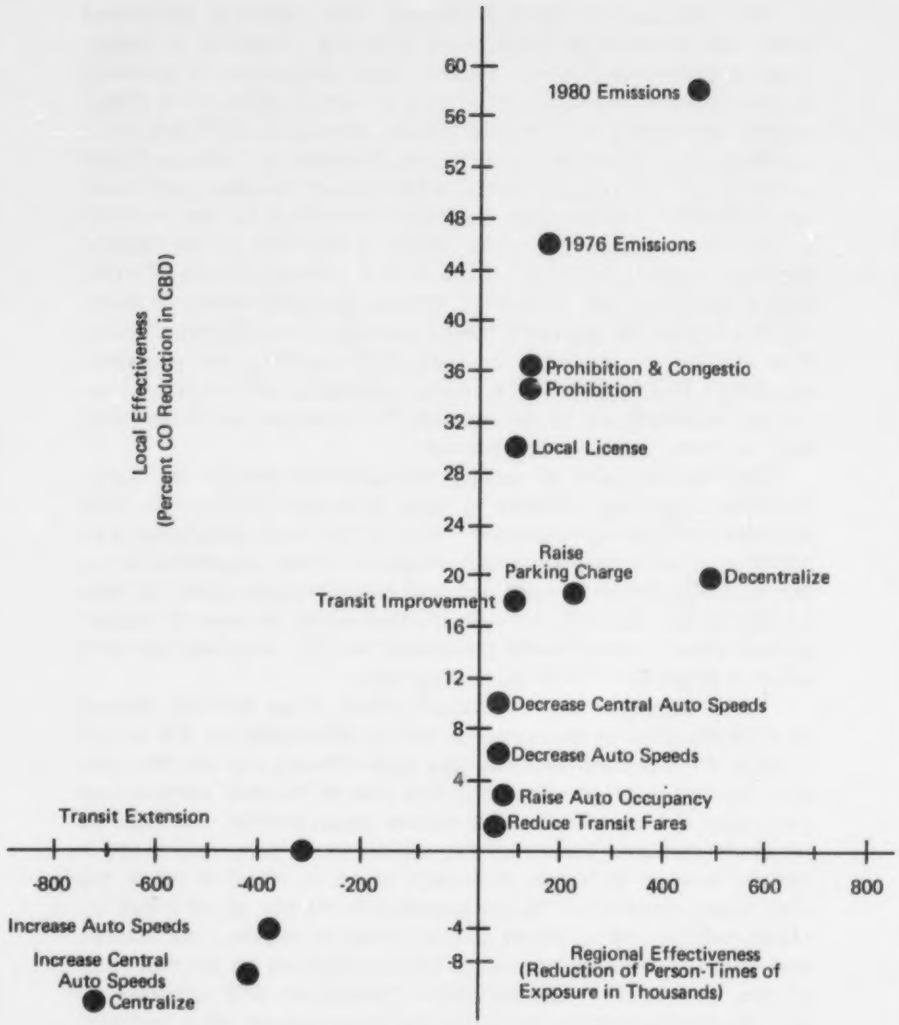

Figure 2: Boston: Local and Regional Effectiveness of Transportation/Air Quality Policies (Carbon Monoxide Only)

As a significant step toward more effective linkage of transportation planning with implementation, DOT plans to require[18] annual submission of 3-5 year capital improvement programs. This submission is to be developed by local officials and submitted by the areawide planning agency.

Air quality analysis is being brought directly into the transportation planning process by virtue of a provision in the 1970 Highway Act. Section 109(j) of the Act states that "The Secretary, after consultation with the Administrator of the Enviromental Protection Agency, shall develop and promulgate guidelines to assure that highways constructed pursuant to this title are consistent with any approved plan for the implementation of any ambient air quality standard for any air quality control region designated pursuant to the Clean Air Act as amended." Applicable to both the metropolitan system level and the individual project level, these guidelines are now in effect.[19] The guidelines require that in all urban areas over 50,000 population, studies will be initiated as a part of the transportation system planning process to insure consideration of areawide air quality implications. Each transportation planning agency must establish a continuing review procedure in cooperation with the air pollution control agency (1) to assess the consistency of the transportation plan and program with the approved Clean Air Act State Implementation Plan ; (2) to solicit comments annually from the air pollution control agency, including its assessment of the consistency of the transportation plan and program with the approved State Implementation Plan, prior to transportation plan approval; and (3) to identify and attempt to resolve differences with the air pollution control agency. Significant deficiences (including major instances of inconsistency) shall be considered by the DOT Regional Highway Administrator as grounds for withholding planning certification. Project level application of the 109(j) guidelines will be discussed after the next subsection.

Transportation/Air Quality System Analysis

Metropolitan area transportation models are basic tools that transportation planning agencies use for the analysis and planning of transportation systems. These models analyze and predict traffic demands based on land activity, trip generation, trip distribution, modal split, and auto occupancy. Steps are now being taken to add air quality predictive capabilities to traffic demand model development as part of the transportation planning process. Some examples follow:

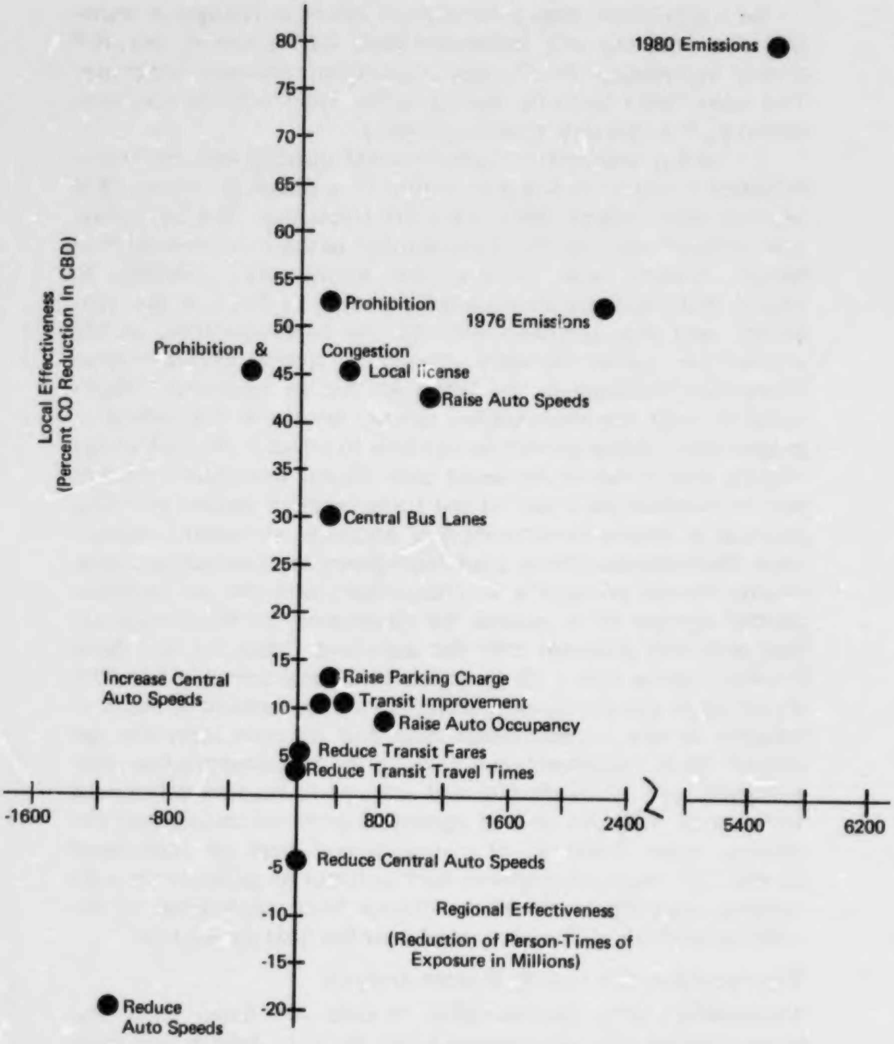

Figure 3: Los Angeles - Local and Regional Effectiveness of Transportation/Air Quality Policies (Carbon Monoxide Only)

"TASSIM: A Transportation and Air Shed Simulation Model,"[20] initially developed under a National Science Foundation contract, was further refined and applied by Harvard University researchers under contract to the Office of the Secretary of Transportation. The TASSIM model integrates an urban transportation planning model, vehicle emission factors, and simple air diffusion models in a simulation framework that can be used to analyze the effects of non-reactive air pollutants resulting from alternative transportation policies. The transportation sub-model is based on the urban transportation planning model used extensively in transportation studies, but with the number of zones greatly reduced (less than 200). The emissions sub-model employs recommended EPA forecasting procedures. The diffusion sub-model incorporates simple air diffusion models developed by meteorologists which assume that the relation between emissions and concentration is linear and additive and that pollutants are non-reactive. Concentrations of secondary (reactive) pollutants which form photochemical smog are not directly predicted by the model. Execution cost has been less than $30 per simulation. The model was applied to alternative transportation control strategies postulated for Boston [21] and for Los Angeles,[22] a summary of which is displayed in Figures 2 and 3.

The second example is the development and application of a model by the Metropolitan Washington Council of Governments under contract to the Office of the Secretary of Transportation. This model can estimate the magnitudes of auto-emitted carbon monoxide, hydrocarbons, and oxides of nitrogen for alternative transportation systems. The model consists of three distinct phases: (1) an auto trip origin sub-model; (2) a submodel which produces forecasts of auto travel characteristics; and (3) an emission level estimator (producing estimates at the sub-area level). The report on this work includes evaluation of alternative transportation systems in the metropolitan Washington, D. C., area. [23] Nine future alternative highway and transit system combinations together with a base year transportation system were evaluated for their effect on auto emissions by sub-area. For comparing alternatives, the sub-area emissions were aggregated to jurisdictional totals.

Under various stages of development by DOT, several other models relate travel demand and air quality at the metropolitan system level. Among these are the Community Aggregate Planning Model (CAPM)[24] which is also a strategic or sketch planning model. CAPM estimates relocatees, land consumed, energy consumed, costs of transportation system construction and operation, travel speed differences, accidents, and other performance measures including amounts of emissions. The highway portion of the model is now in the demonstration stage in St. Louis, Phoenix, Cincinnati, and Baltimore. The transit portion of the model is being developed. Another, titled SAPOLLUT,[25] permits input data from any urban area and outputs automotive emissions by hour of day and by transportation system link. Work is underway now to tie this model to an EPA carbon monoxide diffusion model (APRAC).

Transportation/Air Quality Project Analysis

At the transportation corridor or project level, environmental impact statements on all Department of Transportation actions are required[26] to reflect sufficient analysis of the effects of the project on attainment and maintenance of any established environmental standard. This includes consistency determinations with respect to Clean Air Act Implementation Plans.

At the metropolitan regional scale the 109(j) guidelines[27] (discussed above) are bringing air quality considerations directly into the metropolitan transportation planning process. At the project scale, these 109(j) guidelines are also causing air quality analysis to be an integral part of highway corridor and project planning and design. For the most complex highway projects, these guidelines call for on-site data gathering and a high level of analysis. The 109(j) guidelines require that the environmental impact statement for the project contain (1) an identification of the air quality impact of the highway section; (2) an identification of the analysis methodology used; (3) a summary of the early consultation with the air pollution agency and, where applicable, a summary of any consultation with the indirect source review agency; (4) any comments received from the air pollution control agency; and (5) the highway agency's determination on the consistency of each alternative under consideration with the approved Clean Air Act State Implementation Plan. Where required, the preferred alternative must be submitted to the indirect source review agency.[28] The proposed final environmental impact statement must not be submitted for adoption by the Federal government if the indirect source review agency has found that the highway section results in a violation of applicable portions of the control strategy or will interfere with the attainment or maintenance of national ambient air quality standards. The final environmental impact statement may be adopted only after a determination has been made by the Department that the highway section is consistent with the approved State Implementation Plan.

The Airport and Airways Development Act precludes approval of any Federal-aid project application unless the Governor of the State certifies in writing that the project will be located, designed, constructed, and operated so as to comply with applicable air (and water) standards.

Highway corridor and project level air quality analysis models are being developed by DOT, EPA, and others. The purpose of these models is to predict the air quality impact within and adjacent to highway rights-of-way. To aid in the selection of the best of these models, the Department's Transportation Systems Center in Cambridge, Massachusetts, now has preliminary results of its validation of thirteen separate computer models developed for highway corridor analysis.[29]

Mass Transportation

Virtually all the programs administered by the Department's Urban Mass Transportation Administration are productive toward the achievement of air quality objectives. Included among these programs are grants up to 80 percent of the net project cost for financing the acquisition, construction, and improvement of facilities and equipment for use in mass transportation service in urban areas. UMTA programs make available direct loans for capital improvements and for advance acquisition for real property to be used in mass transportation projects. All of these programs together currently provide funds on the order of one billion dollars per year.[30]

In addition to the above programs, 1973 amendments to the Federal-Aid Highway Act provide a number of opportunities for urban areas to use Federal-Aid highway programs and funds for mass transit improvements and thereby as steps toward achieving air quality objectives. Among these are:

1. Urban system capital grant funds (authorized at $800,000,000 for FY '75) are available for transit purposes in urban areas over 200,000 population.
2. All highway funds are made available for exclusive lanes, traffic control devices, bus shelters, parking facilities, etc. The flexibility provided by the Act is immediately available upon apportionment to localities. Responsible local officials may propose a substitution of a transit project for a highway project in the urban system, the state then having to certify the project's priority within the urban transportation planning process. In FY '75, highway trust fund resources may be used to finance up to $200,000,000 in bus transit projects from the urban system program level. Beginning in FY '76, trust fund resources can finance all projects in the urban system program without constraint as to mass transit mode.
3. The Act passes through one-half of one percent of all apportioned Federal-aid highway funds per year (about $23,000,000 in FY '74) to metropolitan agencies designated by the state to carry out the comprehensive transportation planning process.
4. The Act provides that upon the joint request of a state governor and the local governments concerned, the Secretary may withdraw his approval of portions of the interstate system within an urbanized area of the state. Such withdrawal of approval would be conditioned upon a determination that such route is not essential to completion of a unified interconnected system. Funds available resulting from such withdrawal may then be applied toward non-highway public transportation facilities and equipment.

The Department's Urban Mass Transportation Administration is assisting local agencies in implementing air quality plans. The UMTA Administrator stated to the House Committee on Banking and Currency on July 26, 1973: "We intend to give a high priority to grant applications directed toward implementation of air quality plans." As one example of this intent, UMTA has recently made a $2 million planning grant to the Los Angeles region, a substantial portion of which is being used for the rapid delineation of implementation plans to improve air quality through transportation measures.

The Department's FHWA is placing national emphasis[31] on low capital transportation improvements which would facilitate mass transit use and which can be helpful in achieving air quality objectives. Among these are: fringe and corridor parking facilities, exclusive or preferential bus lanes or streets, bus turn outs, bus shelters, bicycle lanes, pedestrian facilities, and traffic control devices such as separate bus lane controls.

Overall, the Department of Transportation is increasing emphasis on short-range transportation planning and on low capital intensive improvements, both of which are complementary to air quality objectives.

Carpools

Complementary to both air quality objectives and energy conservation objectives, the Secretary of Transportation has requested that the states and local jurisdictions cooperate in the development of carpool plans and programs in each urbanized area. The Department is providing technical assistance and computer matching programs to assist urban areas in carrying out carpool objectives.[32/33]

Eighty-two percent of all working Americans commute to their jobs by automobile, and more than half of this number travel alone. As a result, on a typical day, some 50,000,000 commuter cars are in use with an average automobile occupancy of only 1.6 persons. If this occupancy could be raised only to 2 persons, it would save more than 5 billion gallons of gasoline annually with a proportional reduction in pollutant emissions.

In a DOT survey[34] of all 278 urbanized areas in the summer of 1974 the following was noted:

1. An organized system for carpool matching now exists in slightly over 50 percent of the urbanized areas spread over a total of 37 states.
2. Sixty-nine percent of the organized carpool matching systems are areawide in nature.
3. The type of agencies taking a lead role in organizing carpool matching activity are: areawide planning—39 percent; other (auto clubs, Jaycees, etc.)—33 percent; State—17 percent; City—11 percent.

4. Approximately 3 million carpool matching questionnaires were distributed by various means in 32 of the 37 states having an organized carpool matching system.

Vehicle Emission Control

While EPA is the lead agency for Federal emission control programs for motor vehicles, the Department of Transportation has ongoing activities that are supportive of this effort.

DOT has proposed criteria and procedures for motor vehicle emission inspections to be conducted by state diagnostic inspection demonstration projects. Under the Motor Vehicle Information and Cost-Savings Act, the Department's National Highway Traffic Safety Administration, in coordination with EPA, is authorized to give grants and technical assistance to individual states in order to establish these demonstration projects.

Under the Clean Air Act, EPA adopted standards in 1973 to limit emissions of smoke, carbon monoxide, hydrocarbons, and nitrogen oxides from nearly all engines used on civil aircraft. The Department's Federal Aviation Administration is implementing these standards by issuing rules to prohibit the certification of airworthiness approval or operation of aircraft whose engines do not meet the EPA standards. In January of this year, the FAA issued a rule to limit smoke emissions from jet engines and to ban fuel venting from large turbojets. The FAA has also recommended new ground operating procedures for jets at airports to reduce engine emissions and conserve fuel.

In 1973, a Department-sponsored study was completed, entitled "Economic Impact of Mass Production of Alternative Low Emissions Automotive Power Systems."[35] The study considered a range of possible effects on the transportation industry satellite industry, the labor market, and the economy which may be anticipated in the event that mass production of unconventional low-emission automotive propulsion systems should occur, whether or not as a consequence of Federal intervention. A postulated internal combustion engine equipped with a dual catalyst manifold reactor and other conventional emission control devices was compared in detail with a regenerative free turbine engine and a Rankine cycle engine. Principal conclusions were that conversion over a ten-year period is feasible, that manufacturing cost differentials are less critical than fuel consumption and fuel cost differentials, that industry/employment impacts are minor, and that resource/trade effects are dominated by petroleum impacts. Implications for Federal policy were discussed.

CONCLUSION

Because of their importance to human health and welfare, national ambient air quality standards should be achieved without undue delay, especially when the means to achieve them are consistent with other major goals. In certain circumstances, transportation control strategies are a necessary complement to stationary source controls. Emission control on new cars is a most effective strategy, and delays in full implementation of the emission control program—with any necessary modifications—should be minimized.

For the many instances where air quality goals and transportation goals are complementary, such as increased use of mass transportation, integration of air quality programs and transportation programs should be accomplished for the benefit of both. In the writer's view, this integration can best be accomplished by clear assignment of responsibility for air quality, transportation and land use planning, with strong ties to implementation, to single entities with metropolitan areawide jurisdiction.

In areas where air quality goals require reductions in vehicle miles traveled far beyond what can be transferred to other modes of travel, there is conflict with the transportation goal to provide mobility. To avoid severe socioeconomic consequences, there is need for limited postponement of the attainment dates for ambient air quality standards for these areas.

Legislative or administrative restraint on particular strategies should be avoided. Maximum flexibility should be available to evaluate all strategies and to choose an optimum set of strategies that will achieve the standards. While authority to act at the Federal level should be retained, every effort should be made to have strategy choices made at the most decentralized level of government commensurate with the problem.

FOOTNOTES

[1] See Appendix—Background

[2] Table 1, Appendix A

[3] Speech to Los Angeles Chamber of Commerce, May 16, 1973.

[4] ACIR was created by the U.S. Congress in 1959 to monitor the operation of the Federal system and to recommend improvements.

[5] Advisory Commission for Intergovernmental Relations, *Regional Decision Making: New Strategies for Substate Districts*, Washington, D. C. (October 1973), pp. 215, 348, 373.

[9] 23 U.S.C. 134.

[10] Hayden-Cartright Act.

[11] 23 U.S.C. 134.

[12] 49 U.S.C. 1601.

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[13] 49 U.S.C. 1701.

[14] DOT Order 1130.2.

[15] "Urban Transportation Planning," joint FHWA/UMTA Directive, published in *Federal Register*, November 1974.

[16] Section 204, Demonstration Cities and Metropolitan Development Act of 1966.

[17] Section 701, Housing and Urban Development Act of 1954.

[18] "Transportation Improvement Program," joint FHWA/UMTA Directive, published in *Federal Register*, November 1974.

[19] "Air Quality Guidelines," Volume 7, Chapter 7, Section 9, *Federal-Aid Highway Program Manual*, FHWA, DOT.

[20] DOT-OS-30099, Final Report (May 1974).

[21] *Ibid*...

[22] DOT-OS-30099, Supplementary Report (November 1974).

[23] Metropolitan Washington Council of Governments, *Estimating Auto Emissions of Alternative Transportation Systems*, prepared for the Office of the Secretary, U.S. Department of Transportation, DOT-OS-20004 (April 1972).

[24] Department of Transportation, "The Community Aggregate Planning Model—An Urban Transportation Sketch Planning Procedure," DOT, FHWA, Urban Planning Division (August 1974).

[25] ______________, "Special Area Analysis Final Manual," DOT, FHWA (August 1973).

[26] ______________, Procedures for Considering Environmental Impacts, Office of the Secretary, DOT, 39 *Federal Register* 190 (September 30, 1974).

[27] "Air Quality Guidelines," Chapter 7, Section 9, *Federal-Aid Highway Program Manual*, DOT, FHWA.

[28] 40 C.F.R. 51.18.

[29] For further information: Dr. Eugene Darling, Transportation Systems Center, DOT, Kendall Square, Cambridge, Massachusetts 02142.

[30] 49 U.S.C. 1601.

[31] News Release, Federal Highway Administration, Department of Transportation (October 8, 1974).

[32] Carpool and Buspool Matching Guide, Federal Highway Administration, Department of Transportation (1973).

[33] AMV Associates, "Transportation Pooling," prepared for DOT/UMTA (January 1974).

[34] "Transportation Energy Conservation Measures," 2nd Report, prepared by Urban Planning Division, Federal Highway Administration, Department of Transportation (September 1974).

[35] International Research and Technology Corporation, "Economic Impact of Mass Production of Alternative Low Emissions Automotive Power Systems," prepared for Department of Transportation, DOT-OS-20003 (March 6, 1973).

[7] 23 U.S.C. 104(f).

[8] Conference on Transportation Control Plans, November 29-30, 1973, U.S. Department of Transportation, FHWA, p. 6.

[9] *Ibid*, p. 93.

APPENDIX—BACKGROUND

Organizationally, the Office of the Secretary is responsible for the basic policy direction of the Department of Transportation (DOT) and for coordinating the Department's seven administrations. These administrations are the U.S. Coast Guard (USCG), the Federal Aviation Administration (FAA), the Federal Highway Administration (FHWA), the National Highway Traffic Safety Administration (NHTSA), the Federal Railroad Administration (FRA), the Urban Mass Transportation Administration, and the St. Lawrence Seaway Development Corporation (SLSDC). The Department's field structure includes a Secretarial Representative in each of the ten Federal regions and a regional office for each of the major administrations. Air quality responsibility exists in several elements of the Department in headquarters and field offices. The primary headquarters point of contact with the Environmental Protection Agency (EPA) is the Office of Environmental Affairs in the Office of the Secretary of Transportation. The Department's FHWA, FAA, and UMTA each have environmental offices at the headquarters level that interface with the Office of Environmental Affairs and EPA on air quality activities. Regional field offices of FHWA also have environmental units with air quality responsibility. The basic enabling legislation for Department of Transportation activities relating to air quality includes (1) the Department of Transportation Act, (2) the Federal-Aid Highway Act, (3) the Urban Mass Transportation Act, and (4) the Airport and Airways Development Act. It is within the opportunities and constraints set forth in this legislation that the Department provides support and direction for the achievement of Clean Air Act objectives.

The Clean Air Act requires the Environmental Protection Agency to establish national ambient air quality standards to protect the public health and welfare. To meet these standards, the states are required to develop plans which provide for implementation, maintenance, and enforcement of actions necessary to attain and maintain the standards. Under present legislation, the ambient air standards are to be attained by May 31, 1975, except in some areas where extensions up to two years may be granted. In most of the geographic areas of the nation, Federal emission standards for new vehicles, plus the stationary source emission control program, are sufficient to achieve the ambient

TRANSPORTATION CONTROL PLANS

Table 1

STATE	CITY	PERCENT REDUCTION CO	PERCENT REDUCTION HC/Ox	[illegible]	[illegible]	[illegible]	[illegible]	VEHICLE MILES TRAVELED STRATEGIES								LIMIT [illegible]	OTHER
								[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
ALASKA	FAIRBANKS	58a		*	5/31/77	●	●					●			●		*
ARIZONA	PHOENIX TUCSON	69b	31b	10	5/31/77	●	●		●	●	●	●		●			
CALIFORNIA	SACRAMENTO		71c	86	5/31/77	●	●	●	●	●	●		●	●	●	●	
	SAN DIEGO	50c	76c	50	5/31/77	●	●	●	●	●	●	●	●	●	●	●	2, 3, 5
	SAN FRANCISCO	31b	39b	97	5/31/77	●	●	●	●	●	●		●	●	●	●	2
	SAN JOAQUIN		61c	28	5/31/77	●	●	●	●	●	●		●	●	●	●	
	L.A. / S.E. DESERT	78a	67c	160	5/31/77	●	●	●	●	●	●		●	●	●	●	3
COLORADO	DENVER	66 b	60b	*	5/31/77	●	●	●						●	●		3, 7
D.C.	CAPITAL	58a	63c		5/31/77	●	●	●	●	●	●			●			2, 3, 6
ILLINOIS	CHICAGO	59b		*	5/31/75	●	●	●	●			●					2, 3, 6
INDIANA	INDIANAPOLIS	29c	38c	10	5/31/75	●	●	●	●						●		3
MARYLAND	BALTIMORE	57c	70c	12	5/31/77	●	●	●	●	●	●	●			●	●	5
	CAPITAL		61c	13	5/31/77	●	●	●	●	●	●			●			2, 3, 6
MASSACHUSETTS	BOSTON	58a	56c	*	5/31/77	●	●	●	●					●	●	*	1, 2
	SPRINGFIELD	57c		*	5/31/75	●		●	●						●		2, 3
MINNESOTA	MINN. / ST. PAUL	45b		*	5/31/75						●	●					2, 5
NEW JERSEY	NO. JERSEY	47b	67b	30	5/31/77	●	●	●		●	●				●	●	
	TRENTON MERCER CO.	44b	47b	*	5/31/77	●	●	●		●	●				●	●	
NEW YORK	N.Y. METRO AREA	78b	67c	*	5/31/75	●	●	●			●	●			●		4, 8
	GENESEE LAKES	*	*	0	5/31/75	●											
OHIO	CINCINNATI		42b	0	5/31/75	●											
OREGON	PORTLAND	60c	43c	10	5/31/75	●	●	●			●	●		●	●		5
PENNSYLVANIA	PHILADELPHIA	56b	36c	*	5/31/75	●		●	●	●	●	●		●	●		5
	PITTSBURGH	57b	56c	*	7/1/75	●		●	●	●	●	●		●	●		1, 5
TEXAS	SAN ANTONIO		40b	40	5/31/75	●		●	●	●							3
	DALLAS / FT. WORTH		26b	0	5/31/75			●	●	●						●	3
	AUSTIN / WACO		27b	0	5/31/75												1
	EL PASO		34b	0	5/31/75												1
	CORPUS CHRISTI		58b	0	5/31/75												1
	HOUS. / GALVESTON		75c	30	5/31/77	●	●	●	●	●				●		●	1, 3
UTAH	SALT LAKE CITY	35c		*	8/1/76	●	●				●	●		●	●		3, 5, 7
VIRGINIA	CAPITAL		67	12	5/31/77	●	●	●	●	●	●			●			2, 3, 5
WASHINGTON	SEATTLE	59c		15	5/31/75	●	●	●	●	●	●			●	●		2, 5
	SPOKANE	58d		10	5/31/75	●	●		●	●	●	●		●	●		2, 5

*REQUIRED BUT UNSPECIFIED

1 - AIRPORT ACCESS CONTROLS	5 - BICYCLE ROUTES OR SKYWALKS	a 1970 BASE YEAR
2 - PARKING SURCHARGE (taxation)	6 - IDLING RESTRICTIONS	b 1971 BASE YEAR
3 - FRINGE PARKING OR PARK AND RIDE	7 - HIGH ALTITUDE MODIFICATION	c 1972 BASE YEAR
4 - TRUCK LIMITATIONS	8 - BRIDGE TOLLS	d 1974 BASE YEAR

standards by the date specified. However, in 28 of the 248 air quality control regions, covering the nation's largest metropolitan areas, controls on new cars and controls on stationary sources are found insufficient to achieve the ambient standards and additional measures were necessary. These measures have been termed "transportation control strategies."

The transportation control strategies are directed primarily to reducing motor vehicle pollutants: carbon monoxide, hydrocarbons, and oxides of nitrogen. Table 1 lists for each metropolitan area the expected date for meeting the ambient standards, the pollutants involved, the estimated reductions in vehicle miles of travel (VMT) needed, and the types of transportation control strategies selected. The strategies include retrofitting vehicles to reduce exhaust emissions, inspection and maintenance programs to maintain emission performance, and measures to reduce vehicle travel including incentives to increase carpooling and mass transit use, and disincentives to reduce low occupancy auto use, such as parking taxes, parking restrictions, and traffic controls.

Although complete agreement was not always reached, at the headquarters and field levels, the Department of Transportation has consulted with the Environmental Protection Agency during EPA's preparation, approval, and promulgation of State Implementation Plans, including their transportation control strategies, and has worked with EPA on the development and promulgation of regulations necessary to carry out Clean Air Act requirements. Among the regulations produced by EPA on which DOT has cooperated and provided comment are the basic regulations governing preparation and submission of transportation control plans, regulations on review of indirect sources of pollution, regulations concerning significant deterioration of air quality, regulations on preparation and submittal of parking management plans, and regulations on maintenance of air quality.

Comments

Lane W. Kirkpatrick
Director, Air Pollution Control Division
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INTRODUCTION

First, I was requested to comment on the paper by Norman Cooper entitled "Transportation and Metropolitan Air Quality." In reading his preliminary and unapproved draft, I sincerely hoped that the Department of Transportation would support his comments, as the philosophy expressed by Mr. Cooper is constructive toward solving our urban motor vehicle air pollution problem and shows depth of understanding.

Also representing the state and territorial air pollution administration association, I think my purpose here would best be served by presenting state air pollution control agency viewpoints regarding transportation control strategies as required by the Federal Clean Air Act. To try to more accurately represent state viewpoints, I have received ten questionnaire replies from ten key states with motor vehicle-related air pollution problems. States and key cities that I will discuss herein include Maryland (Baltimore and Washington, D. C.); Utah (Salt Lake City); Texas (Houston-Galveston, Dallas-Fort Worth, San Antonio, Beaumont-Port Authur-Orange, Austin, El Paso, Corpus Christi); Oregon (Portland); Arizona (Phoenix, Tucson); New York (New York City, Monroe County-Rochester); Colorado (Denver); New Jersey (N. J.-New York City, N. J.-Philadelphia); Washington (Seattle, Spokane); and Pennsylvania (Philadelphia, Pittsburgh).

INSPECTION AND RETROFIT

All states surveyed either have some degree of mandatory retrofit or inspection or are considering such programs. New Jersey uses a state owned and operated idle test but has no mandatory retrofit program. Arizona has pilot test lanes and has contracted for mandatory test lanes in Phoenix and Tucson. Chicago has city operated idle test lanes, and Colorado is constructing pilot inspection lanes.

Some major problems encountered by states developing mandatory inspection programs include lack of public acceptance,

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difficulty in adequately training the repair industry, problems of tampering and achieving enforcement against tampering, debates over the relative merits of idle versus key mode testing, of private versus state, of assessing the full nature of degradation after initial inspection, and various political and financial hurdles to implementing programs.

The political problems require a careful step-by-step phasing in of program elements, and only in Chicago, when Mayor Daley declared, "There shall be an inspection program in a year," did the machinery indeed exist to accomplish this deed.

All states needing transportation control strategies are considering retrofit programs, either on their own or because of EPA promulgations. Besides the light duty vehicle retrofit program of California, New York reports a program for heavy duty vehicles. Colorado is now involved in a retrofit certification program which approves devices by manufacturer for later mandatory installation on in-use cars.

Delays in implementing retrofit strategies have occurred because of unexpected degradation after installation (as noted in California), because of manufacturers' reluctance to assist states without strong state enabling authority to install retrofits, and because of EPA not completing its document of uniform certification guidelines. Unfortunately, the retrofit manufacturers have become disenchanted by spending tremendous amounts of money on research and development only to have agencies back down in requiring their installation. They are reluctant to continue research programs at their own expense. For example, some states view retrofits as only having short term clean air payoffs. We have calculated that, for Denver, retrofitting pre-1968 vehicles will not have a beneficial air quality effect after 1980, so our retrofit target vehicle population is 1968-1974 vehicles, which is effective for the year 1980.

High altitude modifications such as screw adjustments or power valve modifications proved successful for reducing carbon monoxide (CO) but not hydrocarbons (HC) and, therefore, not photochemical oxidants, our most critical pollutant in Denver (these adjustments also raise NO_x emissions). The exhaust gas recirculation-air bleed retrofit package is our best high altitude retrofit hope of significantly dropping atmospheric CO and HC while not raising atmospheric NO_x measurably.

Of the ten states surveyed, only the State of Washington reported success with gaseous fuel conversion of fleet vehicles, including conversion of buses from diesel to propane, thus eliminating a publicly objectionable odor problem. New York cites gaseous conversions as being contrary to fire regulations.

Some states control smoky vehicles using opacity regulations, others have anti-tampering regulations for manufacturer-installed control systems, but in the absence of inspection programs, I doubt that anti-tampering regulations can be enforced.

PUBLIC TRANSIT IMPROVEMENTS AND SINGLE-PASSENGER-VEHICLE-USE REDUCTION STRATEGIES

The reaction to and success of different states to these types of strategies are varied. Some states will not touch them with a ten-foot pole; but, where success has been measured, it has been with the cooperation of local and state highway, public transportation, and planning agencies.

The Colorado Air Pollution Control Commission has recently adopted a regulation that requires the implementation in Denver of priority bus lanes and park and ride improvements, that also requires major employers to provide their employees with a carpool locator service and incentives to use carpools, buses, and bicycles. (Incentives may include reserved carpool parking and altering parking availability and pricing structures.)

New Jersey, Washington, Oregon, and New York have reported that programs exist for eliminating on-street parking or restricting additional parking spaces through zoning, building permits, or the like, but the degree of effectiveness of these strategies I could not determine from the questionnaire responses.

Short-range public transportation improvements, such as increased use of local buses, regional buses, express buses, park and ride programs, and exclusive bus lanes, drew a lot of interest from states surveyed, with significant implementation noted. The same was true for carpooling. Manufacturers of buses unfortunately are still well behind in filling the demand of cities for new buses. Also, the lack of progressive public transportation leadership and resources in many cities has been unfortunate, especially now when it is really needed.

Long-range mass transit improvements, adequate to make a really big dent in improving urban air pollution, require at least a ten-year lead time to implement, and sufficient Federal and local funds, perhaps in the billions of dollars. Unfortunately, these funds have been only tokenly made available and the Department of Transportation has not been progressively in support of new mass transportation technology development. Yet the new Bart system and a voter approved 1.8 billion dollar system for Denver, and the energy shortage are recent optimistic signs that public transportation will experience a revival in this nation, especially if systems are made more comfortable and covenient as in the PRT (personalized rapid transit) concept.

State survey results showed scattered success in bikeway planning and use, improved signalization, traffic by-pass techniques, car free-zones, metered freeways, and work schedule changes. On the other hand, negative type single passenger use disincentives are not generally being pursued by states, including wheel taxation for a second car, special license plates for peak traffic hours, road use regulations, income tax reforms, and freeway exit tolls. Gasoline rationing was rejected by most states and was being considered by others only if it came as a result of the energy squeeze or as a last resort in meeting health-based ambient air quality standards. Oregon, hard hit last summer by the gasoline squeeze, showed a 24 percent drop in statewide gasoline consumption during that period but today people are driving around Oregon more than ever, using 9 percent above the baseline pre-gasoline shortage use of gasoline. A couple of states have adopted or are adopting indirect source control regulations. Some public and business acceptance of this strategy is resulting; yet, the real enforcement crunch is still around the corner.

When asked about the EPA approach to air quality maintenance plans, states surveyed generally endorsed the published guidelines of EPA.

In the vehicle emission control area, EPA help is needed in the following areas: to require adequate control of new heavy duty gasoline vehicles, to provide funding under section 210 of the Clean Air Act, to establish a "short test" for emission inspection, and to evaluate and present data to states on emission variability with ambient temperature and altitude for new car controls.

I would like now to present some personal comments in regard to the survey results. States want freedom themselves to decide how Federal ambient air quality standards are to be met. For example, Texas would like to rely very heavily upon stationary hydrocarbon controls with less emphasis on transportation strategies. Colorado and New York, on the other hand, are relying heavily upon transportation controls.

Some states will not apparently meet Federal CO and photochemical oxidant standards in certain cities by 1977, by 1980, or maybe not even by 1985. The question then becomes, "have states done everything practical to meet standards?" Judging by the results of the survey, successes in the public transportation, vehicle restraint area were spotty, with strategies such as mandatory carpool, locator services, bus lanes, parking restrictions, staggered work hours, and major public transportation renovation or plans tending to work in one state, without perhaps another state really getting the information or being motivated to be successful in his own backyard using similar strategies. EPA and STAPPA should step up this information-sharing service to help all involved.

Also, I want to be careful not to oversimplify the task before us and to say that with the strong dedication of the people here today and with the exchange of ideas through the remainder of this week, we will each leave more enriched as to the potential solutions to this vehicle emission problem that is affecting public health. Along this same line, many of our technical air pollution control leaders must realize that technical skills in themselves will not implement transportation and land use strategies. We are now controlling the general public (and not so much industries); thus a high degree of environmental salesmanship with the general public is required. Also, to be successful at these strategies we must work hand in hand seeking complementary solutions to the energy shortage problem, urban blight and congestion, and the problem of inflation by finding less expensive ways of transporting people.

Determination is also a key to success. At recent conferences I have watched technical experts debate the fine points of these strategies until they have almost talked themselves out of doing anything. Fortunately, I possess trust and faith in this vehicle emission control movement and know that while the solutions are difficult, they are possible within certain time constraints.

Once we are convinced of the basic cost and effectiveness factors associated with each new program, we should immediately start implementation, then allow many other detailed problems to be solved as the program is phased in. For example, for a mandatory inspection program, Chicago is rejecting cars without fully realizing what to do for those cars that may never pass. Obviously an answer will have to be found soon but not having all program answers is no excuse not to start the basic inspection program.

Lastly, too much attention has been given to the years 1975 and 1977 to meet standards and still too little attention to the long-range maintenance of standards. Cities and regions should give serious thought to community plans which will, for at least the year 2000, allow a city to grow within air quality standards. To do this, highways and mass transit growth should be balanced so ultimate vehicle traffic densities do not cause ambient standards to be exceeded in any given planning area. Also, land use controls can be used to promote cluster development (thus making mass transit service easier for restricting population, hence vehicle traffic, so new growth is compatible with ambient air quality standards).

To assure compatibility with air standards, an air quality predictive model should be completed of these long-range community plans. Once the plans are deemed adequate, then the case-by-case review of new stationary and indirect sources becomes less necessary as long as new growth is according to the plan that meets air quality goals.

I hope and trust that the outcome of this conference will be another positive step forward in solving our pollution problems. If we, as a group, cannot solve this problem, then who can? We have a responsibility to do everything we can and we are off to a good start.

Comments

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Before I begin with my prepared comments on Norman Cooper's paper, I want to make a couple of points that bear consideration as this conference progresses. Several of the remarks that were made at Sessions I and II have been bothering me, and I want to share them with you.

First, there has been considerable talk about the intent of the Clean Air Act. Several speakers claim that Congress never intended EPA to launch into what has essentially become land use planning—primarily through transportation controls and indirect source rules. Consequently, they say that the law is intended only as an instrument to assure clean air and to protect the nation's health and welfare. It is very important to remember that the law says more than that—it speaks of the need to "protect and enhance the quality of the nation's air resources so as to promote . . . the productive capacity of its population." There is nothing in this verbiage to suggest that "productive capacity" is defined in economic terms alone; it is quite clear that the authors of the law were speaking of human and environmental productivity as well. Therefore, attacking the rules which EPA has promulgated because those rules interfere with the nation's productive capacity (i.e., economic capacity) is sophistry; EPA has several tasks, and one big task they have is working for policies that enhance the quality of people's lives—not just the nation's industry.

A second point: there has been a lot of talk about the need for trade-offs, but the trade-offs to which people have been referring have been environmental sacrifices—in other words, what environmental goals must we sacrifice next so as to help the economy, help the energy situation. I see no indication of trade-offs from the other side, as it were. No one seems willing to make do with less energy, no one seems willing to stop using resources. There has been no talk about adjustment to life styles, or disruptions, if you will, to economic programs.

No one would deny that trade-offs are needed. But if we are going to talk about compromise and adjustments, we are also going to have to talk in terms of equity—there have to be trade-offs on **all** fronts—not just the environment.

A third point: we have all been talking at considerable length about decision-making by various levels of government, by elected officials, by appointed officials—primarily by appointed officials and bureaucrats. This meeting is peopled with planners, with transportation people, with engineers and air resources people—they are the ones who are making all the decisions and this to me smacks of technocracy.

As a planner, I can understand how one becomes rather sure of oneself and one's ability to make good decisions. But as a representative of a citizen's organization, I do not find the prospect of this kind of institutional arrangement at all promising. And my fears of bureaucratic decision-making are heightened when one realizes that of all the participants at this conference, I am virtually the only citizen representative; I am one of only two environmentalists on the program. I would therefore hope that the make-up of this meeting is an aberration; that all of you would value citizen inputs and support. You are certainly not going to get that support—and are going to have an even harder time than you are having now—if citizens continue to be excluded from meetings like this one and from policy-making as well.

Another point: there has been a lot of criticism of EPA's rules on significant deterioration. The League of Women Voters was opposed to the rules, too, but for entirely different reasons. We did not think they were strong enough. One of the major arguments being used against the rules by people at this meeting is that already choked cities will have to accept more polluting industries because those industries will not be able to relocate to the hinterlands where they could pollute. This simply is inaccurate. Rules to prohibit significant deterioration would actually help the cities **if** EPA had included provisions to require use of best available pollution control technologies on all sources, and **if** EPA had included **all** pollutants as being subject to the rules. Had that happened, industries would stay in cities—but they would be clean industries, they would help the cities. As the rules now stand, center cities will be hurt more because it is easier for industry to relocate to cleaner areas where they are less constrained by tough air rules.

Finally, attainment dates. People keep talking about how we have been confronted with entirely unrealistic schedules for meeting SO_2 standards, etc. Since you are all having such a hard time, you then say that we must simply delay some of those deadlines. All of this is being said, however, with an apparent disregard for the very real health effects of various pollutants. It is easy to talk about delaying implementation dates if you choose to disregard the findings of several recent reports—but we simply cannot afford to do that. EPA has said it will make exceptions if areas are making concerted efforts to meet air quality standards—but EPA will do this on an individual case basis only. There is simply no justification—and indeed, it would be foolhardy—therefore to delay all implementation dates.

Let me go to Mr. Cooper's paper, however, and discuss the transportation and land use elements of the air quality plan. As I was thinking about what I could say as a discussant at this session, I was struck by what one could call the peculiarity of the title of the meeting, "Transportation and Land Use Components of a Regional Air Quality Management Plan."[1] I say "peculiar" because the title connotes to me—as I am sure it does to many people—the impression that two important elements—transportation and land use—go into making an area-wide air quality plan. This implies that the overall goal of air quality can be achieved and maintained by manipulating, as it were, two related elements of the planning process.

That is a very noble goal—one that a lot of us would like to see happening—but I doubt very much if that is really the way air quality plans are made. I venture to guess that more often than not, the process is more like "Incidental Land Use and Air Components of a Regional Transportation Plan," or—if you are a bit luckier—"Transportation Components of a Regional Land Use Plan." What I mean by this word-switching is that the whole issue of air quality rarely gets the attention it deserves. It is rarely the end-goal of the planning process. Indeed, many of the air quality decisions that are being made are done so independently of land development plans and are virtual afterthoughts of planners and policy-makers.

No one—not even EPA—seems to know what the elements of a final plan should be. No one seems to know what the final goal should be. Is it land use? Is it air quality? Is it transportation?

I think it is important that there be some form of consensus among interested agencies about what that final goal should be—if there is a final goal. Otherwise, it appears that different interest groups will have different (and probably conflicting) priorities.

Without belaboring this point, let me give you an example. This actually happened at a regional planning agency for which I once worked. We were putting together a general development plan for a large metropolitan area, and like almost every such regional plan, ours had a multitude of sections dealing with all aspects of the region. And like almost every such plan, ours was full of all sorts of recommendations and goals which will probably never be implemented. These shortcomings notwithstanding, when I recently looked at the plan—it having been completed and adopted by the participating jurisdictions—I read with considerable interest the section on air. In a report that was more than 133 pages long, written in tiny print, three columns to the page, there was **one** column on air. And in that one column, there was just one sentence that related to what we are talking about today. It read: "Closer coordination between land use and air quality objectives could further enhance the air pollution control effort." (I might add, parenthetically, that since the plan's formulation, the region—not surprisingly—has had to implement a whole array of transportation control strategies.)

So much for the transportation and land use components of a regional air quality management plan, as they exist in real life. Before I discuss what I think are the key elements in the regional air plan we are talking about, let me first say that Mr. Cooper has some very pertinent comments and without repeating them all, I want you to bear a few of them in mind.

First, the interfaces among transportation goals, clean air goals, and energy conservation goals. There can be no doubt that more efficient, widely-available transportation systems mean less automobile congestion, less air pollution, and less gasoline consumption. All of these are extremely important, particularly at a time when we are confronted by rising energy costs, by increasingly unlivable urban centers, and by a continuing barrage of attacks against air quality legislation. It is therefore heartening to know that, in the midst of this relentless struggle, the Department of Transportation continues to support EPA's efforts to develop transportation control strategies. Not too many other agencies—at any level of government—do.

Second, DOT's expressed desire to see transportation and land use planning decisions made at the metropolitan level are to be commended and, I think, bear repetition. It is high time that air quality, transportation, and land use (as well as a multitude of other subjects) be incorporated into the deliberations of one multi-jurisdictional agency that has the power to make policy and implement that policy. Fragmented authority simply cannot make cohesive decisions that complement one another and benefit all facets of regional development. In addition, the need for such agencies to be responsible to an electorate begins to assure a region's residents that decisions and policies will be made with at least a modicum of public participation. For too long, transportation decisions have been made by a road-building cartel; land use decisions have been made by a developers' cartel; air quality decisions—if they have even been consciously made—have belonged either to a board which is subject to the whims of a governor or else to a state health department that knows little about physical planning.

The problems I have with Mr. Cooper's paper begin, however, when he starts to discuss the specifics of DOT's role in the achievement of clean air. For example, he says that metropolitan areas should have the "maximum freedom" to choose strategies that will best meet their needs. I think what Mr. Cooper is saying is that the Federal government should not be making what are essentially local decisions, but one could also construe his statement to mean that a regional air resources board should be given **carte blanche** in deciding what its air goals and strategies should be. On the basis of past performance by some agencies responsible for air quality planning, I would be hesitant to give those agencies such freedom. And until one can be a bit more secure about that air agency's ability to assess "societal goals" and to meld those goals with what the public wants, until that happens, we may well be faced with local decision-making that reflects purely economic or political considerations.

A manifestation of this problem is nowhere more evident than in the configuration and philosophy of many air pollution control boards around the country. In virtually every state, League members who have been working closely with state and regional air boards repeatedly express frustration at working with agencies whom they consider unresponsive to **public** pressures (as opposed to special interest pressures), and who have little interest or expertise in air-impacting issues such as transportation and land use. In a questionnaire on indirect sources that we sent to 18 Leagues around the country, **every single** League said that indirect source review—if it is to be successful—should **not** be carried out by the presently constituted air authority. The reason given, in every instance, was because these boards were not responsible to an electorate. At the same time, however, Leagues were adamant that the shifting of responsibilities to a duly-constituted local or regional planning agency would have to be accompanied by the issuance of **specific** criteria to guarantee adherence to comprehensive, sound planning policy. And at this stage in the game, it appears that those criteria are going to have to come from the Federal government.

A second point of Cooper's is that transportation control plans should be limited to essentially four kinds of actions, and it is those four steps that indicate to me DOT's unwillingness to consider more far-reaching ways of improving air quality. The actions avoid consideration of the land use component of air quality management, and while land use is not specifically within DOT's purview, no one can deny that virtually all DOT decisions impact dramatically on land use. In other words, Cooper says that minimization of vehicle miles traveled (VMT) has been inadequately researched and its efficacy is therefore open to considerable debate. He suggests, instead, that emissions reductions should be the primary method of pollution abatement.

Statements like this come as somewhat of a surpise to me when another Federal agency—EPA in this instance—has developed transportation controls simply **because** mobile source abatement strategies by themselves have been proven inadequate in reducing air pollution to what are deemed "acceptable" levels. While no one doubts that there are many difficulties inherent in VMT minimization and other such measures, these kinds of policies aim in the proper direction and, more importantly, are particularly necessary if auto emission deadlines are further deferred because of protests from Detroit. DOT seems to be saying, "We're all for cleaner air but don't do anything that will require fundamental changes in traditional patterns of mobility." Perhaps DOT is compelled to seek this route because, in addition to having UMTA under its wing, it also has the Federal Highway Administration. As long as DOT continues to have a stake—a big stake—in road-building, it is not going to undermine its own interests.

Neverthless, according to DOT, the four kinds of actions that should be considered candidates for inclusion in a transportation control plan consist of

1. emissions reductions
2. discouraging low vehicle occupancy (through measures such as parking surcharges, parking management controls, etc.)
3. encouraging higher vehicle occupancy (through carpools, etc.), and
4. other means, such as staggered working hours

What DOT has developed here are a number of approaches that affect every aspect of urban life, some of which mean drastic changes in life styles (and which are therefore as controversial as a policy like VMT minimization). I begin to believe that what the agency is doing is relieving itself of all the thorny decisions and pushing the hard, controversial ones onto the already-burdened shoulders of EPA.

There is an element of unreality in some of these proposals, too. DOT suggests that we ought to be considering things such as a four-day work-week and staggered working hours. There may indeed be good reason to think seriously about those kinds of changes, but it seems to me that if presently-proposed measures such as transportation controls are already meeting tremendous resistance, then there is going to be even greater opposition to even more fundamental change. It is also risky for a transportation agency to be suggesting a kind of change that would have uncalculated effects on human beings. To take just one example, can DOT (or anyone else for that matter) assess with any degree of accuracy the **real** impact an additional leisure day may have on people accustomed to five days of enforced, if you will, activity? That kind of consideration notwithstanding, I think it is safe to say that while a recession might force us to change our life styles, while energy shortages might do the same, clean air goals are **not** going to motivate people to make similar changes. These goals simply are not important enough to many people, especially when there is a powerful and vocal cadre—including segments of an administration—opposing significant and prompt improvements in air pollution control.

A third problem with Mr. Cooper's paper lies in the transportation actions that he says are supportive of air quality. The one that is fraught with most problems (and most potential, perhaps) is "Metropolitan Transportation Planning," the 3-C process. Supposedly a means of insuring comprehensive transportation planning, 3-C requirements have only recently had to incorporate air quality goals into the framework of transportation planning. On the basis of past performance by metropolitan area transportation planners, many of us are skeptical about the effectiveness of 3-C. While it is unfair to generalize, there are an awful lot of roads on the drawing boards whose adverse environmental impacts have been duly noted, and duly ignored.

Let me list, then, what I think should be the components of a regional air quality management plan. They will deal with the things we place upon the land.

THE TRANSPORTATION COMPONENT

One, PROVISION OF FUNDS FOR MASS TRANSIT WITH PRIORITIES FOR THOSE METROPOLITAN AREAS REQUIRING TRANSPORTATION CONTROL PLANS. Ideally, money should be available for mass transit in all urban areas, but funding realities make it particularly important that the bulk of those funds be used to reinforce the control plans. It is ludicrous for the Federal government to promulgate measures that make it difficult for people to drive to work if those people are not then provided with alternative means of travel. Existing mass transit systems simply cannot accept additional passengers—let alone attract those passengers—without significant system improvements. There **must** be coordination between EPA and UMTA.

Two, ALLOCATION OF MORE MONEY FOR MASS TRANSIT. This is a truism; cities are in no financial position to make major improvements to their mass transit systems without increased Federal funding. National goals of energy conservation and clean air can only be met when such funds become available. Budget-cutting and recisions of authorized funds represent false economies.

Three, ADOPTION OF BOTH SHORT-TERM AND LONG-TERM MEASURES FOR EFFECTIVE TRANSPORTATION CONTROL PLANS. Opponents of parking surcharges and other such measures say that cities should be concentrating instead on improving mass transit, including development of fixed-rail rapid transit. Development of those systems in most cities is a long-range goal, however—one that will take years to implement. Planners and government officials have got to develop stop-gap measures. Even assuming that rapid transit systems were the **sine qua non** of air pollution abatement, simply waiting for the day that they arrive is going to do nothing for the more immediate air and transportation problems that face us now.

Four, DEVELOPMENT OF MASS TRANSIT AND ALTERNATIVE PUBLIC TRANSPORTATION SYSTEMS THAT ABATE POLLUTION NOT ONLY FROM AUTOMOBILE-DRIVING COMMUTERS BUT ALSO FROM INTRACITY TRAFFIC. Most mass transit planning now simply expedites commuting for suburbanites, leaving those who need to travel **within** the city without decent public transportation. While there has been a trend in recent years to develop minibus systems (such as buses to shopping, employment, or cultural centers), these systems are plagued with inefficiency and severely limited in their operations.

Five, RETHINKING ASSUMPTIONS THAT LARGE CITIES SHOULD DEVELOP FIXED-RAIL RAPID TRANSIT SYSTEMS. Should we really be spending huge sums of money to develop fixed, capital-intensive rapid transit systems? People who tout the virtues of such systems speak of potential energy savings and air pollution abatement, but they should also be aware of some shortcomings:

* that rapid transit systems reinforce suburban development patterns, doing little to reinvigorate central cities, particularly after working hours. Increased suburbanization necessarily spawns more auto traffic and air pollution.
* that scantily-funded rapid transit systems may mean that cities are unable to plan comprehensive systems with provisions for controlled development around transit stations (i.e., joint development projects, etc.). Cutting corners and eliminating feeder lines or park-and-ride facilities could mean underutilized systems and unabated air pollution.

The final transportation element—INCREASED UTILIZATION OF EXISTING URBAN HIGHWAYS. It may be far more reasonable to develop express bus lanes on already-built highways than to ignore those roads and make huge new investments in highway or rapid transit construction. Similarly, use of existing rail lines should be seriously considered.

THE LAND USE COMPONENT

As for the land use component of the air quality management plan, there are a number of considerations about which we ought to be thinking.

First, PUTTING PRIORITIES ON DEVELOPMENT IN AREAS THAT ARE CURRENTLY ACCESSIBLE VIA MASS TRANSIT. I include recreational uses in this category; the need for recreation facilities that are readily available, especially to the poor, is great not only because of simple fairness but also because reduced auto traffic must necessarily mean better air quality. In a similar vein, we should reconsider—as many jurisdictions are doing—the extensions of sewer and water lines into undeveloped areas.

Second, SUPPORTING RULES THAT PREVENT SIGNIFICANT DETERIORATION OF AIR QUALITY. The rules which EPA proposed late last summer—rules which EPA claimed would permit only moderate amounts of new air pollution—are inadvisable for a number of reasons, one of which is their impact on land use. The preamble to the rules says that the

> "significance of any air quality deterioration is defined in terms of the proper and desired use of an area as well as the magnitude of pollutant concentrations . . . Development of land use plans in which air quality represents a single overriding criterion is not . . . a desirable course of action for most areas. The regulations . . . are therefore designed to inject consideration of air quality as one of many constraints on land use decisions based solely on air quality."

What this means is that desired land use patterns will determine what kind of air a region will have. To draw a parallel with the title of this panel, what EPA is suggesting by its rules is that an air quality management plan is the **aftermath** of land use decisions—not that an air quality plan contains a land use component.

The effect of non-degradation rules as they are now proposed foretell the start of land use policy being made not by a state, regional, or local planning agency but by an air pollution control board with no definable constituency or planning expertise. What can happen, then, is that a state with a land use policy will have to adjust clean air zones to coincide with approved land use plans; a state without a land use plan will inadvertently gain a plan that is based **solely** on an air quality classification. I think we would agree that neither alternative is desirable.

Third, CHANGING TRADITIONAL LAND USE AND ZONING. It is all too evident by now that segregation of uses reinforces our dependence on automobiles. Last winter's long gasoline lines started a few people thinking about energy-conserving development, in which people could walk or bike to work or to shopping, but the present availability of gas—at no matter what cost—appears to have pushed innovations from the public consciousness. Officials who are setting development policy can reinforce the concept of a less car-dependent society by promoting development of new towns in-town, and by requiring developers of large office, shopping, or residential complexes to incorporate other uses in their structures (i.e., apartments and shops in large office buildings, neighborhood shopping facilities in residential developments, etc).

Fourth, A SYSTEM OF TRADE-OFFS TO ENCOURAGE DEVELOPERS, PARTICULARLY OF SHOPPING CENTERS AND RESIDENTIAL COMPLEXES, TO INITIATE ALTERNATIVES TO PRIVATE AUTO TRAFFIC. Cities have learned that developers will do almost anything for an increase in building bulk! A city can permit a developer to increase a structure's height, for example, if he provides such things as carpools and dial-a-bus or jitney service, and if he guarantees their operation. Strategies of this sort are an off-shoot of the kinds of actions EPA is promoting as part of its parking management plans.

And fifth, EXPANSION OF THE CONCEPT OF INDIRECT SOURCE REVIEW. This is probably anathema to the planners and developers who are now struggling under existing EPA rules on indirect sources, but there it is, just the same. Indirect source review is the most obvious way that air quality can be achieved and protected because it recognizes the very basic link between land use and air pollution. There are a tremendous number of problems in implementing indirect source review, but conversations with local government officials and citizens around the country convince me that a lot of those problems could be minimized by EPA's explaining the process somewhat more lucidly to citizens, government officials, bureaucrats, and developers.

Along these lines, I think we should consider the adoption of indirect source review procedures at the metropolitan or local level for uses not subject to the EPA's rules. An example: a drive-in fast-food restaurant may have a very limited impact on a region's air quality, but it can also have a significant impact on the **neighborhood** environment.

In going through this rather lengthy list of transportation and land use considerations, I begin to arrive at the conclusion that dwelling on a multitude of policies—like parking surcharges or rapid transit or indirect source review—causes us to avoid—consciously or not—what may be the most fundamental and lasting "cure": It is changing **development** patterns to eliminate our incredible dependence on the automobile. This means, of course, radical changes in the ways we are accustomed to living, but we ought to keep in mind that the demands of inflation, world food shortages, and energy shortages mean big changes, too. Lessened reliance on private cars does not spell the demise of the car or some form of private transportation. It does not mean, either, that we will be able to do away with mobile source emission control or with indirect source review. Not too many people, myself included, really want to live in Paolo Soleri-type megastructures, but at the same time, we cannot live in Broadacre City, Arcosanti's ideological opposite. We should keep in mind, therefore, the very timely conclusions of the study done for HUD, EPA, and CEQ—**The Costs of Sprawl.** Let me read to you one brief portion:

> "Air pollution has two major sources: automobiles and residential heating. Higher density developments require less energy for heating, and higher density and better 'planned' communities stimulate less automobile use. Thus the high density planned community generates about 45 percent less air pollution than the low density sprawl community." (p. 4)

This is what we really must end up thinking about, then, when we talk about managing air quality: transportation and land use issues are but two concommitants of growth.

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[1] This was the title used in the original program for this presentation.

Session IV

Inputs From Planners And Managers

Chairman:

Carl Shy, Institute for Environmental Studies,
University of North Carolina at Chapel Hill

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Information Requirements Of Land Use Planners Concerned With Air Quality Management: How The Planner Can Breathe Easier

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INTRODUCTION

New responsibilities thrust on land use planning agencies related to Federal, state, and local initiatives in the areas of urban growth management and environmental quality management are creating considerable tension among urban planners. The environmental impact statement process, that procedural end run around the traditional comprehensive land use planning process, started it all. The attempt to redefine land use planning as urban growth management is a current headache. Somewhat surprisingly, air quality regulations **to date** have had hardly any impact on the planners' workload. Their involvement has typically been similar to that of many locally elected officials—reacting with skepticism or even anger at the latest air quality regulation emanating from the EPA regional office. Part of their inactivity in the field of air quality management is simply that they have not been asked to do anything. This will hopefully change as the states initiate the air quality maintenance planning process. Even if the planner wanted to do something, the rapidly changing institutional environment in which he must operate has caused at least partial paralysis. Resolution of many institutional problems over the next year—at least in California—will see the planners' workload related to air quality management increase significantly. Initially, considerable time will be spent just finding out about the other actors—how they think and operate. Then, the planner will have to decide how the air quality management planning process relates to the planning process in the agency or jurisdiction where he or she is employed.

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Institutional Structure and Information Needs

While planners and informed citizens looked to "national land use policy" legislation during the last year as the tool for creating a new state planning apparatus, the 1970 Amendments to the Clean Air Act and the 1972 Amendments to the Federal Water Pollution Control Act have been producing significant institutional change almost under the planner's nose. Due in part to court orders and opinions that have resulted in a rapid and major expansion of the perceived scope of the Clean Air Act, EPA regulations **as they impact California** are producing the following types of institutional change:[1]

1. An increasing role for regional governmental agencies in air pollution control, particularly through transportation planning
2. An increasing awareness of the importance of general purpose government, from the city council to Congressional level, in maintaining air quality standards
3. A decreasing importance for single purpose agencies such as air pollution control agencies, transit districts, and local land use planning agencies, which seem unable to coordinate their activities
4. A decreasing role for state and county governments as EPA bypasses what it considers their recalcitrance to join city governments and general purpose regional agencies in effectively dealing with air quality problems
5. An increasing involvement of the business community, particularly retail merchants, in the air quality planning process at the local and regional level.

EPA, after an uncomfortable year promulgating transportation control plans and implementation plans for a number of uncooperative states, is now making a conscious effort to promote air quality planning at the municipal and regional level rather than at the Federal level. Air quality management in the United States, which has suffered from bureaucratic rigidity and jealousy in state and local government, lack of time, and lack of data, is now going through a period of creative change. Political power is flowing to those levels of government which take the initiative. With a multi-disciplinary approach to air quality management the general purpose governments are starting to play a greater role.

My first conclusion, then, is that air quality data need to be in a form understandable and usable by decision-makers in general purpose units of government.[2]

The Timing of Data Needs

Unlike the Federal Water Pollution Control Act (P. L. 92-500), the Clean Air Act did not clearly spell out the need for a continuing planning process under which the states would develop and monitor an air quality management process including procedures for the attainment, maintenance, and preservation of air quality over the entire state. For a variety of reasons familiar to many of us, air quality management up until the present has been regulation promulgation and plan preparation, often with relatively little connection between the two. For example, the non-significant deterioration regulations do not call for planning to accompany regulation; they only establish facility-by-facility review and do not require consideration of any other strategies. Only now is EPA coming to grips with the need for a continuing process of plan implementation and plan monitoring, evaluation and reassessment.

The transition is seen in the final air quality maintenance and parking management regulations and, in regions with transportation control plans, indirect source review regulations. For each designated pollutant, these regulations call for a plan outlining the strategies necessary to maintain the appropriate standard. Still missing, however, is a clear requirement that a continuing process be developed to implement any plan which is prepared. For example, the air quality maintenance regulations lead to a plan, not to a process to insure maintenance.

My second conclusion, then, is that air quality data need to be in a form that responds to requirements of a continuing plan implementation process.

Data Requirements at Different Levels of Government

The Federal system of government in the United States allows and encourages the delegation of power and authority to the most local unit of government willing and capable of making effective use of that power, with successively higher levels of government responsible for the deficiencies of levels below them. Thus, even though we recognize that air pollution tends to be a regional problem, most land use controls still reside in the hands of local government. Even though it seems inevitable that regional and state governmental agencies will acquire greater land use planning responsibilities with the passage of time, barring a drastic change in our system of government **most** land use decisions will continue to remain at the local level.[3]

My third conclusion, then, is that the air quality management process will require differing types and amounts of data depending on the level of government involved. Please note that this is distinct from my first conclusion.

A DATA REQUIREMENTS FRAMEWORK

Since I work for a regional planning agency I suppose I have somewhat overstated my conclusions, fearing that you would expect me to say that EPA should give regional planning agencies $250,000 each to add an air quality element to the comprehensive regional plan and that the problem would be solved. Although the staff at the Council of Governments I work for is always on the lookout for a stray dollar, we are painfully aware of the inadequacies of regional land use planning and have no quarrel with the assertion that in regions requiring the use of transportation and/or land use controls to attain or maintain the standards, the current institutional arrangements for integrating these activities with air quality are primitive or non-existent. We do feel, however, that our regional planning process, subject to some modifications, is ideally suited for air quality maintenance purposes and can be used to define the planner's data needs.

At the risk of some degree of oversimplification the process has three major aspects:

1. Reviewing city and county plans for consistency with the regional plan
2. Reviewing projects of "regional significance" for conformance with the regional plan
3. Through memoranda of agreement and other means, attempting to insure that the plans of special purpose regional agencies are consistent with the regional plan and vice versa.

Those of you familiar with the Federal Highway Act of 1973 should remember that Section 109j requires that all transportation plans prepared pursuant to the Act be **consistent** with the State Implementation Plan (SIP). It is a logical extension to expect that regional land use plans could be revised to incorporate air quality constraints and that local land use policies and plans be consistent with the regional plan. In similar fashion, I would hope that the State of California will be able to determine whether our regional plan and policies are consistent with state plans and policies.

Reading through the three volume package of air quality maintenance (AQMP) guidelines[4] put out by EPA that include four possible modes for the division of responsibility between state and local governments in preparing and implementing the AQMP, I am struck by the fact that there is no discussion of a mechanism for the resolution of intercity and county conflicts on development decisions or to insure coordination of the air quality management program with other environmental programs. As the guidelines note, land use planning and environmental control programs have developed separately at all levels of government, most often in single purpose programs aimed at specific environmental problems. Land use decisions, of course, are influenced by zoning, public utility extension policies, and the tax structure. Given the incredible number of decisions made by governmental units that impact air quality, it seems obvious to me that a procedure to determine plan consistency is required. Air quality has to contend with social, economic, and other environmental goals, and what seem to be almost inevitable development and growth trends.[5] I would submit that the only manageable procedure for air quality maintenance planning will allow local units of government the opportunity to make conscious tradeoffs through their land use planning process, within a framework set by a general purpose regional agency and state government.

For projects of such a size that local institutions are unable to make a decision that does not have major negative externalities, a regional review is appropriate. At the request of local member governments, ABAG now reviews and evaluates projects of "regional significance." One of the selection criteria for such projects are the thresholds for indirect source review. As a part of this review we consider air quality as only one of the number of regional impacts of the project. Since this review procedure is very new, I cannot report to you at any length on how the procedure operates except to note that the two major issues which have come up so far in the reviews are: (1) tax revenues going to localities involved, and (2) air pollution.

Regional planners do a lot of coordinating. As Paul Watt noted, there are plenty of agencies to coordinate with in the Bay Area. This is a time consuming and often a very difficult activity. The results of such coordination are sometimes negligible—at least from the perspective of some special purpose agencies. Under an air quality management process, determining the consistency of many functional plans with the air quality maintenance plan takes on special importance. Of particular concern is consistency of the regional transportation plan with the regional land use plan **and** the air quality maintenance plan.

The close connection between land use and transportation needs emphasis. I would like to share with you the position taken in a recent draft policy paper prepared in the EPA Region IX Office (San Francisco) on the utility of land use controls to achieve and maintain air quality standards. The paper asserts that the current inability to quantify the effectiveness of a given land use configuration as a strategy to reduce an areawide oxidant problem requires continued emphasis on transportation controls as a primary component of an air quality maintenance plan. The authors conclude that:[6]

> " . . . in sub-state areas with significant areawide oxidant problems, an approvable management plan should be quantitatively required to show attainment and maintenance through transportation strategies (even unreasonable measures) and other quantifiable controls. Transportation strategies are typically implemented by one or a few regional entities. They, therefore, offer more workable institutional arrangements than the current fragmented structure for land use control and thus greater probability of effective implementation. Transportation strategies, such as increased public transit, provide alternatives to assist in adjusting to new life styles and are, therefore, more politically acceptable than the regulatory nature of land use controls. The impact of most transportation decisions on VMT often far exceeds the impact of typically parcel-by-parcel land use decisions. In addition, the legal authority of EPA to impact transportation decisions through Section 109j of

> the Federal Aid to Highways Act, Parking Management and Indirect Source Review is better established than it is in land use matters.
>
> Where approval of a sub-state management plan is based upon controls other than land use measures, but land use measures are included in the management plan, the credit to be accorded land use would be inferred from ambient air quality monitoring as the land use controls are implemented. If the rate of ambient air quality improvement in an area indicated that the land use and transportation strategies were working better than was quantitatively projected for all controls exclusive of land use, then amendments to the plan altering the mix of strategies to one less socially and economically disruptive could be approved.
>
> In this approach to the areawide oxidant problem, land use controls serve as supplemental strategies whose effectiveness is not factored into approval of the management plan, but is considered in plan amendments once monitoring has provided a more quantitative basis for approval. The AMP provides the framework for such an iterative approach to attainment and maintenance."

If we accept this proposition, the heat is kept on the transportation planner while the land use planner has some more time to do his homework. This is an important point because even though the long-term interconnection between land use and transportation decisions is agreed upon, we just cannot quantify that relationship for the time frames application under the Clean Air Act. While the transportation planners are continuing to make their project by project decisions within the framework of the Transportation Control Plan, the land use planner working in concert with the air pollution control staff and the transportation planners will be developing the quantitative relationship between the assimilative or carrying capacity of the regional airshed and allowable emissions within defined parts of the airshed. This technique is called emission allocation planning.

Emission allocation planning is a more broadly drawn technique than the emission density zoning to be discussed by John

Roberts.[7] Both emission allocation planning and emission density zoning relate air pollutant emissions to land use and transportation plans. However, while emission density zoning ties specified emission levels to an areal definition, such as pounds of sulfur dioxide per acre per year, emission allocation planning only develops limits on pollutant generation within planning areas. The determination of how to limit emissions within prescribed boundaries is left to local planning decision-making.

For example, air pollution control specialists might determine that a metropolitan area must limit emissions of particulates to 1,000 tons per day. This determination would be based on analyses of the assimilative capacity of the ambient air in the region. By exceeding the 1,000 ton per day ceiling the national air quality standards could not be maintained on, for example, an annual average basis. Thus, air quality maintenance over the next ten years would not be possible without the emission ceiling.

Planning areas within the metropolitan area, whether they be counties, municipalities, or other sub-areas, would then get some share of the 1,000 ton per day ceiling on particulates through the use of an analytic allocation procedure. A county, then, might be assigned 200 tons per day of particulates by the allocation procedure. It would be up to the county planners to determine how best to meet this 200 ton per day limitation. A heavily-industrialized county might already be near or at the ceiling for particulate emissions. Ways of reducing emissions from existing sources would have to be found before further growth contributing significantly to particulate emissions could be allowed.

It becomes immediately obvious that emission allocation planning requires continual interactions between land use and transportation planners and air pollution control specialists. As is the case with emission density zoning, air pollution control agencies would both aid in establishing emission ceilings and in enforcing the regulations. Planning agencies would be faced with developing future land use and transportation plans constrained by emission ceilings.

Emission allocation planning is little more than a recommended approach at present—there will surely be many problems in attempting to implement it.[8] It does, however, provide us with the necessary regional framework for determining consistency of plans. To me, this characteristic overwhelms any objections raised against the approach. Most importantly, given the very real constraints of the health-related air quality standards, it lets the general purpose units of governments remain an active participant in regional environmental quality management.

DATA NEEDS FOR THE PLANNER

After a rather extensive introduction to the topic assigned to me—"Information Inputs that Land Use Planners Need from Air Quality Managers"—my actual list is rather short, but I think it does reflect my earlier conclusions.

Needs From State Agencies and EPA

1. How do I deal with the equity issue? Pollutants are generated here and impact receptors there. For example, how do I tell San Francisco to reduce the emissions of the precursors of oxidant so the Livermore Valley can continue to grow?
2. Who is going to tell me how wastewater management relates to air quality management?
3. Who can I call upon for help as problems arise? A clearinghouse is necessary where planners can take their problems.
4. How are tradeoffs going to be made between technological and institutional/social controls?
5. What are emission factors? How are they to be used?
6. What overall framework is the basis for air quality management?

Needs From Regional Agencies

1. What does consistency of plans actually mean?
2. What is the assimilative capacity of the region?
3. In simple terms, what is air quality modeling all about?
4. How does air quality maintenance planning relate to comprehensive planning?
5. What is the realistic time frame for the implementation of an emission allocation procedure?
6. How do land use decisions relate to transportation decisions within the region?
7. What techniques are to be utilized to monitor progress on plan implementation?

Needs From Local Agencies

1. How do I develop consistency with the regional plans?
2. How do I actually calculate the air quality implications of my local land use plan?

3. How do I negotiate and resolve conflicts with the regional agency over my share of the allowable emissions for the airshed?
4. How do I introduce air quality considerations into every recommendation on land use I make to the City Council or Board of Supervisors?
5. How do I get support from outside my jurisdiction for what inevitably will be very difficult political decisions?

CONCLUSION

This paper has strongly emphasized the importance of institutional concerns in determining data needs for the land use planner. It is an accepted part of administrative theory that data needs are determined by the institutional structure within which they are generated. I could have discussed data requirements in terms of kilometer grids, nesting of grid square to calculate background emissions, data requirements of rollback versus diffusion models, and the like. But to me these are secondary issues to the institutional ones, and much easier to solve.

FOOTNOTES

[1] See Larry Pryor, "77 Clean Air Deadline Spurs Southland Action," *Los Angeles Times* (October 28, 1974), p. 3.

[2] Data in this case are broadly defined to include all aspects of regulatory programs aimed at achieving and maintaining air quality standards.

[3] At least one political scientist believes that all the activity in State legislatures to pass land use legislation is only the illusion of reform, not a quiet revolution. See Frank Popper, "Land Use Reform: Illusion or Reality," *Planning* (September 1974), pp. 14-19.

[4] EPA Office of Air Quality Planning and Standards, *Guidelines for Air Quality Maintenance Planning and Analysis*. Research Triangle Park, N. C. (July 1974).

[5] An interesting exercise for any planner concerned with influencing development patterns is to calculate the "build out rate," which is a determination of the amount of land already committed to development by zoning and building permit decisions.

[6] EPA Region IX, *A Proposal for Air Management Process: An Alternative to the Fragmented Approach*. (n.d.), 35 pages.

[7] See the section on emisson allocation procedures in G. Hagevik, D. Mandelker, and R. Brail, *Air Quality Management and Land Use Planning*. New York: Praeger (1974).

[8] A discussion of problems of implementing both EAP and EDZ are found in R. Brail and G. Hagevik, "Air Quality Management as a Constraint on the Comprehensive Planning Process: Emission Allocation and Emission Density Zoning Strategies," Presented at the American Institute of Planners Confer-In 74, Denver, Colorado (November 1974).

Comments

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On a technical level, I have virtually no quarrel with Mr. Hagevik's paper. It appears to address some real issues. Its appeal for guidance and clarity in interpretation of regulations must strike a responsive chord in the heart of any planner who has dealt with The Word as handed down by any Federal agency. Rather than take potshots at minor items in the paper, I should like to attempt to put it in perspective, and use it as a springboard for a plea to planners in general to think of a different role for ourselves, both in land use and transportation planning.

My first reaction to the general tone of today's sessions (Session IV) was that the planners are saying, "Maybe **this** will make them take planning seriously!!" "This," of course, refers to the Air Quality Management standards now being imposed upon the planning process. Unfortunately, I have heard the same statement made about the so-called 3-C (continuing, comprehensive, coordinated) planning process requirements, the Environmental Impact Statement requirement, and other demands made of planners. I regretfully suggest that the AQM standards are no more the key to proper respect for planning than national land use planning, mass transit, Personal Rapid Transit, or any other single strategy. If we planners want to be taken seriously, rather than reacting to each new set of regulations as it comes out, we must assume a different role. Before describing that role, it will be helpful to put the Air Quality Management standards in historical perspective. To do so, the transportation planning process will serve as a convenient model.

An integral part of any rational planning effort is the testing of alternatives against evaluation criteria. Back in the "good old days" of transportation planning, the alternatives were fairly simple and so were the criteria. For example, to decide between a traffic signal and a stop sign, we used to look at cost, capacity of intersections, and things like that, and then make a decision.

After this process had been in use for some years, someone discovered that installing a traffic signal here affected traffic flow over there, and so we began dealing in networks, thereby enlarging the number of alternatives. We also began to get inklings of the interrelationship between transportation and land use, and our list of evaluation criteria expanded to include benefits to the economy resulting from construction of new faciilties.

Not to stretch an oversimplified description too far, through successive generations of transportation planning studies we developed a much more comprehensive list of alternatives. We have consistently added to the criteria list as we became aware of the many ways that our actions in transportation investment affected the entire pattern of land use, the social costs of relocation, the quality of the environment, and so on. In a word, we have internalized many impacts that used to be considered as external to the planning process.

Where do the Air Quality Management standards fit into this scheme? I would be willing to bet that, looking backward several years hence, we will realize that the current flap over AQM is simply the usual flurry that accompanies the internalization of yet another set of evaluation criteria to be considered in looking at alternative programs. At present, we are being told that these standards must be met as a **sine qua non** of planning. Again, this refrain has been heard before. As the realization of the potential conflict between AQM standards and other desirable goals grows, and as awareness of the trade-off between meeting AQM standards and meeting other socially desirable criteria increases, we will probably see balance restored among the competing demands of various sets of criteria.

A substantial amount of the discussion at the conference has dealt with measurement of the criteria. Without deprecating the importance of this issue, let me put it in perspective: measurement of criteria is an issue with technological and modeling aspects that must be resolved in the course of evaluating alternatives. In other words, it is one step in an evaluation process.

Finally, on the subject of perspective, it must be kept in mind that once alternatives are measured and their scores on various criteria have been recorded, the evaluation is not complete until goal weights are attached. In other words, until the relative importance of the various measures is assessed, the evaluation is not finished. Attaching goal weights to the measures is a political issue, and therefore one in which the technical participants can only point out the consequences of various courses of action, with regard to scores on individual criteria.

Having put AQM standards in their proper place, let me try to do the same for planners. I am somewhat dismayed at the reactive posture of planners that I mentioned earlier, and would like to ask if there is a role for planners as innovators. I realize the difficulty in an attempt to move planning out of the technical area and into policy areas, but it seems to me that the effort could be worthwhile.

By innovators, I mean the individuals who are at the heart of "making things happen" in an urban setting—those who are responsible for plan implementation. Traditionally, transportation planning and implementation have gone together for some time, at least to the extent that the planners have been part of the State Highway Department or State DOT. There was a time, some decades ago, when land use planning and implemenation went together as well, and the action was in the private sector. For example, the community of Shaker Heights, Ohio, was planned around the trolley lines that ran within convenient walking distance of every home in the village. The high-activity center, Shaker Square, was placed at the junction of two branches of the trolley line. The private developers of the area were able to sell lots for home building in part on the basis of the ready access to downtown afforded by the trolley line they had built. In other words, we really did have coordinated land use and transportation planning taking place in the private sector.

For many reasons, it no longer appears reasonable to expect that kind of coordinated development to be produced by private individuals. The constraints are too many; the linkages to other parts of the area too intricate, the financial requirements too high, and the development lead times too long. The history of New Towns in this country illustrates my point all too nicely. However, I think it is appropriate for us as planners to begin thinking in terms of a more active role in implementation of the plans we help develop and evaluate. This implementation will, in all probability, occur in the public sector. At the very least, it will require a combination of public and private effort. Having experienced both the disappointment of having a good plan ignored for lack of the necessary institutions for implementation and the reward of helping create the institutions that could—and did—implement a plan, I am convinced that we have a professional responsibility to move in this direction.

What Transportation Planners Need

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INTRODUCTION

When asked to speak about "What transportation planners need" at an air quality conference, I am quickly tempted to respond: time and money would help, along with more carrots and fewer sticks. I am also reminded of a natural law which applies whenever transportation controls or other restraint strategies are suggested to deal with air quality problems. It is: "For every action there is an equal and opposite reaction."

For the past few years, air quality goals were on the side of the angels. Less energy consumption, reduced urban sprawl, more public transit were all in agreement with improved air quality. And these goals are still valid. But, we now are faced with the equal and opposite reaction of higher and higher transit deficits, fewer auto sales (hence more older, heavier polluting cars), and possible adverse economic impacts of environmental actions. It would certainly appear that this problem is a difficult nut to crack, and is not very amenable to simplistic, quick, and cheap and easy solutions.

It should be clear to even the most rabid air quality fan that empty buses do not contribute to the solution of the air pollution problem, that high parking charges are politically unacceptable if adequate alternatives are not available. The transportation planner, then, is faced with a dilemma—how to balance these sometimes conflicting goals and objectives—how to find and implement cost-effective solutions to **both** the transportation **and** air quality problem.

NEED FOR BETTER PROBLEM DEFINITION

What air quality problem? Where? When? Is it changing? How? Whom does it affect? Much improved air quality measurement programs are needed. As a transportation planner, I understand the need to state precisely the problem to be solved if meaningful cost-effective solutions are to be achieved. I am not at all happy with air quality problems stated in one hour a year somewhere in the region terms. A year ago the Metropolitan Washington Area had seven air pollution alerts, presumably caused by HC and NO_x forming photochemical smog. This year we have had one. Are transportation planners to use the same solutions for both years? Why must the people of the region have their mobility curtailed on non-episode days?

One way to reduce HC and NO_x levels is to concentrate development to reduce trip lengths, increase transit use, and reduce auto dependency. This same strategy, however, may lead to higher levels of CO at these locations. What advice can air quality or health experts give about the trade-offs involved? If VMT is to be reduced by X, whose X is it, and where? Much more specificity is needed. Regional rollback statements will no longer suffice. The socioeconomic impacts of such reductions need exposure to the light of day.

NEED FOR GOALS AND OBJECTIVES

It would seem that the obvious place to make some progress on air pollution reduction is by retrofitting and inspecting older vehicles in the traffic stream. It should be pointed out that if this strategy is implemented, as well as traffic control, VMT reduction strategies will be **less** effective. Are we going to retrofit or not? When? Who's in charge here?

Assuming that we do, the proportion of the problem to be handled by traffic control plan strategies, maintenance plans, and parking management should be clearly identified. Do these compete or complement each other? These three transportation-related activities need to be planned together, not sequentially, as new promulgations appear and various agencies react.

In particular, goals and objectives must take into consideration some realistic time frames for improving public transportation to serve as one alternative. We **can** tie higher density, low sprawl land use, automobile restraints, and parking supply to improved transit, but it cannot be done tomorrow morning. Political reaction in the Washington area to the imposition of parking charges had two dimensions: 1) that adequate public transportation be available, and 2) that equal treatment be given to the CBD and outlying suburban business and shopping areas.

Since that time, the Transportation Planning Board has, in cooperation with all local transportation agencies, defined "adequate" transit. This definition seems to be politically acceptable, at least for planning purposes. An area is considered to have adequate transit service when two of every three employees can reach the site from their home in 45 minutes or less by public transportation on a door-to-door basis.

By this definition, **no** areas are presently adequately served by public transportation in the Washington, D. C., area. As the rail rapid transit system phases in, some areas start to meet this criterion. As shown in Table 1, we can expect only a four percent maximum reduction in regional vehicle-miles of travel after imposing parking surcharges in such areas.

How people will react to and be affected by such changes is a key issue. We know from prior research into satisfaction with transit service, that transit users are willing to tolerate slower speeds than auto users. Still, user satisfaction drops off rapidly (see Figure 1) if high speeds are not provided for long trips. Walking and waiting time are also critical determinants of satisfaction and use. Transit systems, even with major investments, cannot be upgraded overnight.

Given the above, it would seem that transportation planners need to consider seriously non-facility solutions, such as flexible working hours and four-day weeks, to meet the legal requirements of air quality laws. This seems especially needed if transit equipment is to be used for more than one peak hour trip each way and if **significant** VMT reductions are to be achieved. It would appear that some full-scale demonstrations, accompanied by some sound before and after measurements of traffic flow, air quality, and other impacts, are in order.

NEED FOR DEFINITION OF THE ROLE OF THE TRANSPORTATION PLANNER

I sometimes get the feeling that air quality people are very much like the owl who advises the centipede (the transportation planner) that he can solve his sore feet problem by changing into a grasshopper. After trying and trying, he reports back to the owl that he does not seem to be able to do it. The owl replies, "I gave you the big idea, you work out the details." Just what role should the transportation planner play in the process of improv-

Figure 1

TRANSIT USER SATISFACTION

FOR WORK TRIPS

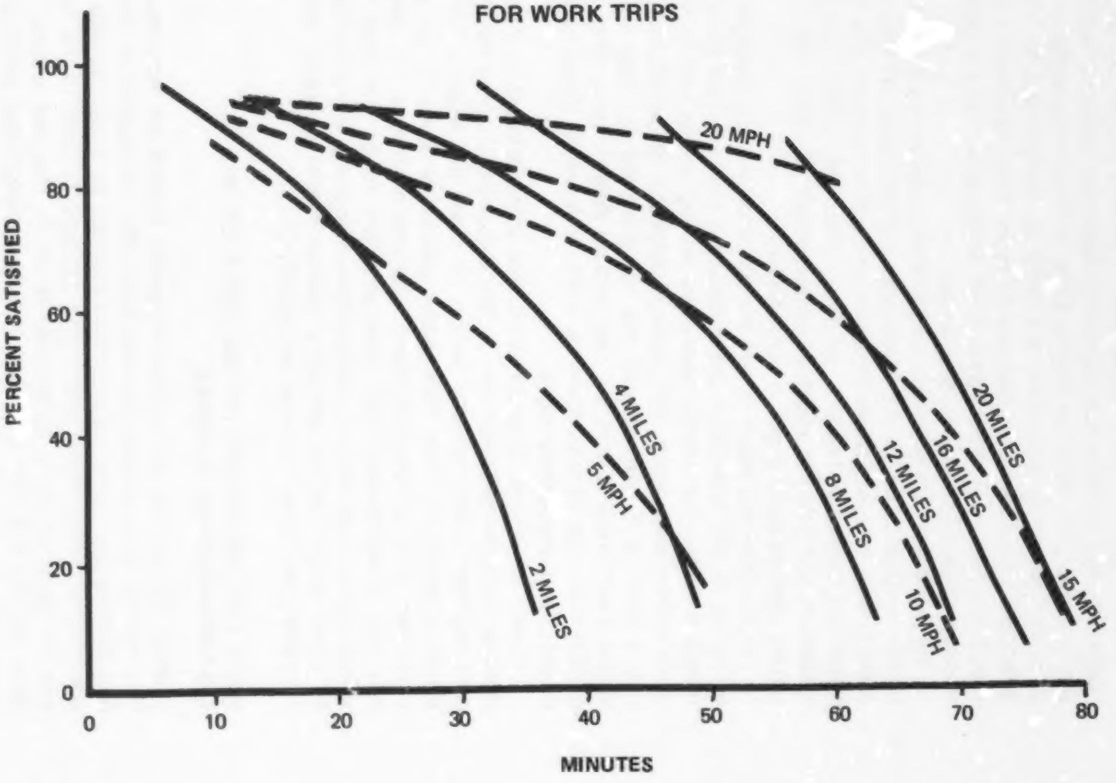

TABLE 1

EFFECTIVENESS OF PARKING STRATEGIES ON WORK TRIP VMT

Areas Adequately Served By Transit

1977

Suggested Areas	Fortcast 1977 Work Travel (Base Code) (1) Person Trips	Transit Trips	% Transit	Work Trip VMT	% VMT Reduction/Parking Disincentives[1] Elim. of Free Parking (2)	$1.00 Surcharge (3)	$2.00 Surcharge (4)
CBD	182,300	111,100	61	502,200	8	17	24
Capitol Hill	16,000	8,700	54	53,400	17	25	32
Southwest Mall	32,300	19,700	61	97,400	9	18	25
Remainder of D. C. Core (Ring 1)	51,100	26,900	53	173,500	20	27	34
Silver Spring CBD	17,800	4,900	28	67,100	16	21	23
Rosslyn	13,400	6,900	51	50,400	16	24	30
Pentagon	21,500	11,600	54	78,100	18	26	33
Totals	334,400	189,800	57	1,022,100[2]	12	21	28

[1] The VMT reductions while affected by home-to-work model shifts are generally applicable to total 6-9 AM vehicular travel.

[2] The total VMT attributed to commuters into the seven areas represents about 16% of regional 6-9 AM VMT. Thus, the elimination of free parking in these areas would reduce 6-9 AM regional VMT by approximately 1.9% (12% x 16%), the $2.00 surcharge strategy by about 4.4%. This compares very well to the 4.3% reduction projected for this strategy in the Implementation Plan promulgated by EPA. (See "Technical Justification of Transportation Control Strategies", MWCOG and R. H. Pratt Associates, October 1973.)

Source: Metropolitan Washington Transportation Planning Board ing air quality? How much is expected of him? The transportation planner should be counted on to consider the air quality impacts in his deliberations, but not to the total exclusion of other goals and objectives. Air quality is far from being solely a transportation issue. The whole subject of air quality maintenance is related directly to land use and regional development.

LAND USE AND TRANSPORTATION

The consequences of a dispersed land use pattern can be seen clearly using data from the 1968 Washington, D. C., Home Interview Survey, shown in Table 2. As the region expands, relatively less travel per household is by transit, even for CBD destinations. In addition, because of increasing separation of activities the vehicle-miles of travel generated per household will also increase.

Table 3 shows the marked differences in vehicle-miles of travel per household, even with improved transit. This is also the case with transit use, with transit use decreasing greatly depending on location, as shown in Table 4.

The present and some possible future distributions of households for the Washington, D. C., area are shown in Table 5. Present forecasts continue the trends established in the 1960's, and call for one-half of the region's households to be located in the outer suburbs (outside the beltway) by 1992, compared to less than a third today. Two other land development alternatives are shown for comparison purposes. A "controlled growth" plan might redistribute one-quarter of this outer suburban forecast equally between the central cities and the inner suburbs. In effect, this would reduce the household increase in the outer suburbs from 550,000 dwelling units to 350,000 units over the 24-year period. It would increase the number of dwelling units in both the central cities and the inner suburbs by one-fourth.

A third land development alternative might be to emphasize city growth by calling for an approximately equal increase in units in each of the three areas: city, inner suburb, or outer suburb. This centralized growth would further change the balance between the central and outer suburban areas.

If these three land development alternatives are compared on the basis of impact on transportation demand by using the indicators in Tables 3 and 4, the effect of concentrated versus

TABLE 2

TRANSPORTATION DEMAND INDICATORS
Washington, D. C., Area (1968)

		Percent Use of Transit*		% of Trips to CBD	Daily-Vehicle Miles of Travel Household	Avg. Auto Trip Distance		Daily Avg. Mi. Per Resident Automobile
	Ring	To CBD	Total			Home To Work	Home to Non-Work	
CBD	0	60	38	81	3.7	6.1	3.3	9.0
CITY	1	58	26	62	6.1	4.5	4.2	3.6
	2	54	18	50	9.1	4.8	3.8	9.6
BELTWAY	3	42	15	44	15.4	6.3	4.2	13.0
	4	20	6	33	27.6	7.5	4.4	15.6
	5	14	4	28	37.6	9.2	5.4	18.2
FRINGE AREA	6	12	2	20	40.0	10.1	6.3	19.0
	7	8	1	14	46.3	14.5	7.1	24.2
	ALL	34	19	33	30	8.0	4.9	15.9

*To work—percent use of transit for nonwork travel (2/3 of trips) was 3.0%

Source: 1968 Home Interview Survey Data, Washington, D. C.

spread development can be estimated. Table 6 shows that even with improved transit, vehicle-miles of travel are expected to double if present forecasts (trends) are borne out. This is, of course, a direct result of the doubling of households, but is also the consequence of the location of these households. If, however, the centralized growth policy were pursued, a reduction of nearly a sixth in vehicle-miles of travel could be anticipated.

Table 7 shows the effects on estimated transit use. An increase of nearly a fourth in the number of riders could also be expected under a centralized growth policy.

BROADENING THE OBJECTIVES OF THE PLANNING PROCESS

In the long run the ability of the urban transportation planning process to influence the magnitude and arrangement of land use activities to reduce vehicular travel demand and associated air pollution may prove to be the most significant and dramatic measure of its effectiveness.

If the decision-maker is to seriously consider the potential of land use controls to help solve air pollution problems, he needs a better understanding of the transportation and air quality impacts of his land development decisions. We know that decisions on land development often create environmental problems that transportation planners must face in trying to serve the travel generated as a result of such land development.

What the transportation planner needs, then, is a comprehensive approach which interrelates air quality, transportation, and land use planning. It is really time to take stock and design a process that can work, and get away from ad hoc quick and simple solutions. There are none.

NEED FOR DATA AND METHODOLOGY

Finally, I would be remiss in addressing the topic given to me if I did not comment on our continuing need for better data and methodology. Again citing Washington, D. C., area experience, I believe we have the necessary data and tools at the regional level to deal with VMT reductions and forecasts, the effect of improved transit, and the like. In other words, the methodology driven by old home interview orgin-destination data and

TABLE 3

DAILY VEHICLE-MILES OF TRAVEL PER HOUSEHOLD

Washington, D. C., Area

	Existing Transit	Improved Transit*
City	15	10
Inner Suburbs	28	24
Outer Suburbs	40	36

*Estimated

TABLE 4

DAILY TRANSIT USE (PERCENT OF DAILY TRIPS)

Washington, D. C., Area

	Existing Transit	Improved Transit*
City	15	30
Inner Suburbs	6	12
Outer Suburbs	2	4

*Estimated at double present relative use

NOTE: Use of transit for work purposes is approximately double the above

TABLE 5

DISTRIBUTION OF HOUSEHOLDS
Washington, D. C., Area
(thousands of units)

		City*	Inner Suburbs	Outer Suburbs	Total
1968		330	240	250	820
1992					
	Trends	400	400	800	1,600
	Controlled Growth	500	500	600	1,600
	Centralized Growth	600	500	500	1,600

*Includes Washington, D. C., Arlington, and Alexandria

TABLE 6

REGIONAL VEHICLE-MILES OF TRAVEL
Washington, D. C., Area
(thousands of miles daily)

		Existing Transit	Improved Transit
1968		21,700	18,000
1992			
	Trends	49,200	42,400
	Controlled Growth	45,500	38,600
	Centralized Growth	43,000	36,000

NOTE: Internal trips only

TABLE 7

DAILY TRANSIT RIDERS

Washington, D. C., Area
(thousands of daily trips)

	1968	1992
Existing Service	407	—
Improved Service		
Trends		1,270
Controlled Growth		1,450
Centralized Growth		1,560

conventional generation distribution, modal choice and assignment techniques is adequate to develop regional transportation control strategies. This is not the case, however, when we deal with detailed facility assessments and EIS preparation. Here, the need for link-specific volume and speed information is paramount. In fact, such information must be derived for peak as well as daily flows. One promising technique that needs to be utilized more is Micro assignment. This technique utilizes a windowing technique along with selected link analysis to deal with a specific sub-area and facilities within that sub-area. It deals specifically with peak traffic periods and can deal separately with trucks.

Based on a recent report[1] documenting the accuracy of the process, it can be expected generally to match the accuracy of the ground counts used to check the assignments. In addition, link speeds are well simulated as well.

In dealing with indirect sources or with so-called major generators, our largest needs are for constant and reliable trip generation information for non-residential sites.

We have good data for traffic generation from residential areas and have some sound estimating techniques for large-scale shopping centers. Data for other non-residential activities are spotty and rarely reflect transit or carpool potential. Home interview data are of little use, and it would seem that we should now begin to obtain our information at the site itself from employees, rather than in any other manner.

The concept of parking facility review or parking management also places requirements on the planning process. Parking controls, either by pricing or by restricting the supply, will have considerable spill-over effects. Some drivers will switch to transit or carpool, but others will drive and park in different locations. Some trips may be foregone entirely. Recently, we attempted to use a model which could redistribute parkers based on changes in parking policy.[2] The model was sound theoretically, but when applied to the Washington central area, took too long and was, therefore, too expensive to run. So, it is not enough to have sound theory, good data, and the like. These procedures must also be capable of being applied within the time and budget limitations of the real world if we are to obtain the right answers.

FOOTNOTES

[1] Summary of a talk given by John Hamburg at the Transportation Research Forum, San Francisco, October 10, 1974.

[2] *Park-Alocat,* developed by Peat, Marwick, and Mitchell for the Federal Highway Administration.

Comments

Harold Kassoff
Maryland Department of Transportation

In discussing George Wickstrom's paper on what transportation planners need from air quality managers, I would like to focus on three major areas—(1) our technical responsibilities, (2) our functional responsibilities, and (3) the need for balanced judgment in formulating air quality related transportation programs.

On a technical plane, I believe transportation and air quality planners can readily agree, as Mr. Wickstrom indicates in his paper, that what we need is better problem definition, including better data and better technical tools for predicting the air quality affects of transportation proposals. But let's face it. Planners will always argue that they need better data, better tools, and more time and money with which to advance the state of the art. The problem is that we are being asked to develop answers **now** for implementation tomorrow (if not yesterday). Now, I believe it comes within the planner's territory to be called upon to provide technical information before he or she as a technical person is totally satisfied with his kit of tools, or with the data it is producing. I am sure we have all found in our respective fields that decisions will not wait until we say we are ready with our inputs. So we must do the best we can with what we have.

But (and this is a very important "but"), I strongly believe it is a matter of intellectual honesty and professional integrity to point out the limitations and uncertainties which are associated with the imperfect, best available, information we are bound by duty to provide.

Regrettably, however, we tend to overlook our technical shortcomings. Instead, we provide answers which appear definitive to problems which are characterized as being well defined, when we know that the variation and uncertainty underlying them can, and do, involve **order of magnitude** differences. In particular, air quality planners, well aware of the limitations of their own technical procedures, do not appear willing to account for the almost embarrassing level of uncertainty inherent in the numbers produced by themselves and by transportation planners. For example, in highway project planning studies which we conduct, we are required to produce a wealth of detailed data reflecting forecast peak hour traffic volumes and speed by link, including forecasts of turning movements at intersections, stratified by age distribution of the vehicle fleet, gasoline and diesel trucks, and so on. Never mind our admonitions that these numbers could be off by 100 percent or more. The numbers are needed to predict CO concentrations at an exact distance from the edge of a particular highway pavement to a particular sensitive receptor, and that is that. EPA standards apparently cannot cope with uncertain numbers, so their uncertainty is ignored. But whom are we fooling?

Similarly, transportation planners seem to be somewhat sensitive about probing the uncertainties involved in the air quality planners' data and technical tools. Several months ago when we suggested that a joint transportation/air quality study which we are undertaking in the Washington Region attempt to trace through and quantify the uncertainties inherent in the chain of forecast of population, employment, land use, trips, traffic, speed, emissions, concentrations, and so on, our suggestion was treated as if we were attempting to slaughter some sacred cow. Some air quality planners may not participate in the study if their methods were questioned, we were told. Forget the methods, we were advised. Concentrate on implementation.

Where is the intellectual honesty that we, as professionals, are obliged to live by?

I should note that there are exceptions. A case in point is the National Academy of Sciences and Engineering report on Air Quality and Automobile Emission Control submitted to the Senate Public Works Committee just two months back. In referring to the costs and benefits of auto emission controls, the report concludes that the monetary benefits reasonably expected to accrue from implementing Federal emission control standards are commensurate with expected costs. But this conclusion is drawn only after consideration of the limitations of the analysis, and the ranges inherent in the assumptions and in the data. The report states quite honestly that it can "make no pretense to providing accurate, firmly rooted quantitative estimates." This sort of candid qualifier appears throughout the report, but does not prevent the drawing of what appear to be rationally drawn conclusions. Nor should it.

So what do transportation and air quality planners need in the technical area? Surely we need better data and better tools. We can all agree on that. But we also need the rigor and self discipline to convey to each other, and to decision-makers, the degree of confidence or lack of confidence which underlies the information and recommendations which we are obliged to provide.

Mr. Wickstrom's paper also addresses the role of transportation planners. What is our function vis-à-vis air quality planners, land use planners, decision-makers, and the public we are bound to serve? Land use planners tend to be advocates of the judicious conservation and use of scarce land resources. Air quality planners are unabashed advocates of cleaning up the air, and well they should be. Both look to transportation as a key ingredient in achieving their aims.

Transportation planners have traditionally been what I would affectionately term "mobility freaks." Our charge, as we understood it, was to move people and goods from point A to point B as quickly, cheaply, and safely as we knew how. Well, it turns out that our mission is not as simple as all that, and that has become a difficult pill to swallow. The world does not turn on level of service C, or volume/capacity ratios, or user cost/benefit studies, we are told. Transportation is not an end to itself, so there must be a broader need than is implied by our narrow, transportation-oriented statistics.

Believe it or not, most transportation professionals have begun to accept this. The problem is that no one, including ourselves, has been able to define a mission that is acceptable to a broad range of interests.

The Chambers of Commerce still want to build freeways. Environmentalists fear that we are paving over the country every time we attempt to improve an old, two lane country road that is now clogged with 30,000 suburban vehicles a day, forgetting that these vehicles are probably emitting far more hydrocarbons and CO than if they were traveling on a well engineered, modestly designed, plain, old surface arterial street. Land use planners argue for clustered, high density, urban centers conducive to efficient public sector services such as adequate mass transportation, while at the same time planning and zoning boards are downzoning such areas because residents decry the congestion, and, yes, the pollution they will bring. Air Quality managers tell us that under the new EPA parking regulations they may have to reject the transportation planners' proposals for large fringe parking facilities at rail transit stops because, even though they will presumably help the photochemical oxident problem, they may violate CO standards. Elected officials demand of the transportation planner public transportation service with short headways, large service areas, low fares, and no deficits. Meanwhile, public transit agencies are compelled to pay drivers $6-7 an hour to sit around between shifts, while trying to figure out how to meet huge, growing deficits. Energy conservationists tell us that radical shifts in travel behavior will be necessary in the near future if we are to meet our energy needs, while the Federal Department of Transportation cautions transportation planners not to count on funding for the kind of large-scale transit improvements we know to be necessary to significantly affect reliance on the private automobile.

So when Mr. Wickstrom asks, "What is the role of the transportation planner," I think about some of the fundamental conflicts such as I have mentioned, and how we are expected to become all things to all people. We cannot on our own resolve this web of conflicting objectives and narrow interests which has been placed upon us. We cannot even cop out and argue for "mobility." Transportation planners can, however, and should influence decisions by answering the crush of "What if" questions which have been tossed our way by those who look to transportation as the panacea that we professionals know it is not. **What if** we implement the control strategies promulgated by EPA? **What if** we do not, or cannot? **What if** adequate parking at transit stations is disallowed? **What if** communities adjacent to transit stops insist on an auto oriented density of development? **What if** we can no longer afford to expand bus service? **What if** Federal funds for large-scale public transportation improvements, which we were encouraged to believe would be forthcoming, are cut back. **What if** we are stopped from improving that two lane country road with 30,000 vehicles because environmental groups fail to recognize that doing nothing is often more damaging than doing something. These are obviously just a sample of the kind of "what if" questions we must address.

We then need a mechanism for negotiating tradeoffs among these conflicting pressures. Unfortunately Air Quality legislation and regulations generally deal in absolutes, while in the real world everything is relative. As we provide answers to some of these questions, it becomes painfully clear that some very difficult adjustments and tradeoffs are going to have to be made. Transportation planners, who confront these conflicts on a day-to-day basis, generally understand and accept this. I am not sure if air quality planners do.

So for the transportation planner adequately to fulfill his role largely depends upon whether his clients who are asking these difficult questions, and particularly his air quality clients, will appreciate and acknowledge the broad range of often conflicting issues he faces, and are prepared to make the kind of tradeoffs, adjustments, and compromises which are necessary to achieve any worthwhile objective.

Lastly, as a transportation planner, I cannot resist the opportunity to comment on an area in which transportation and air quality professionals have had their most lively head-to-head discussions—namely, the VMT reduction elements of the transportation control strategies promulgated by EPA.

In the Metropolitan Washington Region I believe it can be argued that air quality and transportation planning staffs worked as closely together in developing the original submission to EPA as was the case anywhere in the nation. In the Baltimore Region as well there was considerable interaction between transportation and air quality staffs. In both cases, the technical work that was done in support of the submitted plans was somewhat of the quick and dirty variety, the quickness and the dirtiness of which were apparently soon overlooked by many of those who prepared them, and seemingly all of those in EPA who reviewed and adopted most of their recommendations in the promulgations in 1973. But the work done was, indeed, of the "best available" variety, and EPA argued that it was constrained by provisions of the Clean Air Act.

Putting these technical and legal issues aside for a moment, and at the risk of appearing somewhat frivolous about what is an extremely serious topic, let us take what I consider a light hearted, but hopefully common sense look at the approach to the transportation strategies. Let us imagine a scenario in which someone from outer space—referred to by some astronomers as LGM's or Little Green Men—arrives on Earth to interview a state air quality official on the subject of Transportation Control Strategies. The scene begins:

"What is the problem your trying to solve?" asked the LGM soon after arriving at the air quality expert's office.

"Air pollution," responded the official.

"Air pollution?" asked the LGM. "What's the problem with air pollution?"

"Well, you see, air pollution here on earth causes health problems," the official replied. "Roughly one percent of our urban health hazard stems from air pollution. This may not sound like much, but it amounts to perhaps 15,000 deaths per year, according to this report from the National Academy of Sciences."

"I see," said the LGM, "that is a serious problem. Tell me, though, why are you using these Transportation Control Strategies to help your air pollution problem?"

"Well," said the official, "you see, this report says that automobile emissions may account for as much as one quarter of one percent of the urban health hazard caused by air pollution."

"Well, I suppose that still amounts to a significant problem," said the LGM. "But tell me, what is it about the automobile that causes air pollution?"

"It's that darned internal combustion engine," the air quality official replied. "It gives off all sorts of gases that are hazardous to the health of people here on earth."

"Uh huh!" said the LGM. Then, after a few moments of contemplation, his little green eyes lit up, and he offered what he thought was a solution to the problem. "Why don't you phase out the internal combustion engine and use some other source of power?" he exclaimed excitedly.

"Oh, we've thought of that," said the official, "but so far we've decided against it. Has something to do with our stake in the oil industry, and the fact that we haven't come up with a suitable substitute yet."

The LGM was quite surprised by this response. "But don't you have a shortage of oil on your planet?—and isn't yours the civilization that just figured a way to land men on your moon?" he asked, not realizing he was using one of earth's tiredest cliches.

"Listen," said the official, "I don't make the rules. The politicians do, and they've decided to stick with the internal combustion engine and try to clean it up so it won't pollute as much."

"Oh! Well, I suppose that makes some sense, too," conceded the LGM. "So you're going to fix the internal combustion engine so it doesn't pollute any more," he said, trying to be agreeable.

"Well, not exactly," said the official. "For one thing, it's impossible to clean it up entirely. Also, our big vehicles called trucks aren't really controlled as they probably should be, and the automobile makers have been given a few time extensions in meeting the standards we've set."

"But why?" asked the LGM, now becoming more and more puzzled.

"I told you," said the official, now becoming somewhat irritated with his quest, "it's those politicians".

"So that's why you need the Transportation Control Strategies," offered the LGM.

"Right," said the official, pleased that at least one point had finally sunk in.

"Well, I suppose those strategies must have quite an effect," the LGM said.

"Well, somewhat of an effect," the official responded.

"About how much would you say?" asked the LGM, realizing he was beginning to press his luck.

"Well, if you must know," answered the official, "here in Maryland where photochemical oxidents are the main problem, the VMT elements of the control strategies amount to 1 percent of the necessary hydrocarbon reduction in Baltimore and 7 percent in Washington."

"One percent and seven percent?" repeated the LGM, thinking he may not have heard correctly.

"I'm afraid so," said the official. "And if you must know the full story, we're not even sure about the 1 percent and 7 percent. In Washington, for example, they've just expanded bus service according to the EPA plans . . . 19 percent more bus service, but it produced less than a 9 percent increase in ridership, which is less than 1 percent of all trips in the region. Meanwhile the bus deficit in Washington has gone up from less than $2 million for the first six months of public operation in 1973 to $40 million per year now. And frankly, no one knows who's going to pay that kind of money. And expansion of bus service is only one of the strategies in Washington. We have a carpool program, but no one has detected a significant impact. We're building bikeways like EPA told us, but we hardly see any commuters using them. We had a parking surcharge in our plan, but Congress threw it out".

"To tell you the truth", the official confessed, happy finally to get it all off his chest, "it's really a mess. We have one of the most active public transportation programs anywhere—expansion of bus service, improving commuter rail operations, building a rail system—and with all of this, when we tested our long range transportation plan last spring we found that if the Federal government would just control pollution from trucks, we would be able to meet standards. Control of trucks would have had a greater effect in the long run than all of the transportation control strategies combined. Thank goodness we're improving public transportation for other reasons besides just air quality."

The LGM looked at the obviously shaken official and tried to think of something positive to say before he left. The best he could manage, as he began to depart, was to scratch his little green head and to utter softly, "Gee! There must be a better way." He drifted out of the office, slightly more confused about the ways of earth men than when he came in.

The official, who soon regained his composure, ran out of his office after the LGM, only to see his space ship taking off for places beyond, leaving a trail of thick but harmless smoke in his wake. "Are you sure you're not a transportation planner?" the official shouted after him, shaking his fist.

I must say frankly that I have often felt like our Little Green Man as I have asked some of the same questions he did, only to receive a similar kind of muddled response—it may not make a whole lot of sense, but that is the way we are doing it.

Fortunately, in Maryland we do have an aggressive public transportation program. Our unique multimodal trust fund is supporting commuter rail, rapid rail transit, bus capital and bus operating programs in both the Baltimore and Washington Regions. To a large extent these programs support long-run air quality objectives. However, they are not, in themselves, going to bring about the kind of shift from automobile oriented transportation that air quality planners seem to be expecting, particularly in the very short run.

At any rate, I question whether a host of VMT-related transportation strategies in Baltimore to achieve a one percent contribution toward required hydrocarbon reductions reflects good, balanced judgment and common sense.

What do transportation planners need from air quality managers? I would say in closing that I agree that better problem definition and better technical tools and data are needed, and would only add the need for more candor in accounting for their limitations. I agree with Mr. Wickstrom about the needed definition and understanding of our roles, and would only add the hope that we all recognize the conflicting nature of pressures placed upon transportation planners. And finally, I think Mr. Wickstrom would agree that in wading through the morass of legislation, regulation, technical procedures, and conflicting pressures, we must hang on dearly to our most prized possessions—common sense and good judgment. These qualities are particularly important as we work in an area which few may question in terms of objectives, but in which many are beginning to express doubts about the methods we have chosen to achieve them.

Data Requirements for the Design and Implementation of Strategies for Maintenance of Clean Air Goals[1]

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BACKGROUND

Regional planners and air pollution control officials have long recognized the interrelationships between regional development patterns and environmental quality. Point-source controls, the mainstay of air pollution control activities from the early smoke-watching days to the current emphasis on sophisticated control equipment such as electrostatic precipitators, catalytic oxidation devices, and flue-gas desulfurization units, are now appreciated as a necessary but insufficient solution to the problem of long-term maintenance of clean air standards.

The Clean Air Act Amendments of 1970 and related court decisions have formalized the requirement that the air quality planning process be integrated with broader considerations of land use planning.

The following references are most pertinent:

> **Clean Air Act Amendments, Sec. 110(a), December 1970**
>
> Each State shall . . . adopt a plan [Implementation Plan] . . . which includes emission limitations, schedules, and timetables for compliance with such limitations, and such other measures as may be necessary to insure attainment and maintenance of such primary and secondary standard, including but not limited to land use and transportation controls.
>
> **FHWA Guidelines, 38 Fed. Reg. 31677, Nov. 1973**
>
> Highway agencies planning, constructing, and maintaining highways pursuant to 23 U.S.C., shall consult with appropriate local, state, and Federal air pollution control agencies and assure that decisions on highways are consistent with approved state implementation plans and that adequate consideration is given to the preservation and enhancement of air quality.

> **EPA Regulations 39 Fed. Reg. 31000, Aug. 1974 (Prevention of Significant Air Quality Deterioration)**
> The regulations proposed below are therefore designed to inject consideration of air quality as one of many constraints on land use decisions, but not to mandate land use decisions based solely on air quality. In this regard, the "significance" of any air quality deterioration is defined in terms of the proper and desired use of an area as well as the magnitude of pollutant concentrations.

This conference has been organized in recognition of the responsibilities of many different parties in and out of government for making this process work. Ultimately, the burden falls upon regulatory officials to design, defend in evidential proceedings, and implement air quality maintenance strategies. This paper is organized in terms of that regulatory process and focuses upon the data requirements at each major stage.

DATA MATRIX

The principal steps in the air quality management process and the associated key data requirements are summarized in Figure 1. Tables 1 and 2 identify codes for data sources and data quality used in Figure 1. Moving from left to right, the columns of this matrix present the maintenance problem as one of definition, quantification, and design and implementation of control strategies. These activities are outlined in the following Section.

The matrix further identifies the most likely source of each data element as well as my opinion of the accuracy of currently available data relative to the accuracy required by the particular step in the air quality management process. Note a given data element can be scored differently (e.g., "A" vs. "C") for different uses.

STEPS IN THE AIR QUALITY MANAGEMENT PROCESS

Quantification of the Maintenance Problem

The "maintenance problem" in its purest form obeys the following scenario:

> 1971 Implementation Plans promulgated point- and area-source controls sufficient to attain national clean air

> standards by mid-1975. Delays in this schedule (e.g., energy-related variances) affect only the time table but not the validity of the control strategy. However, expanding industrialization and urbanization between 1975 and 1985 **may** erode the gain achieved by affecting the aforementioned controls so that clean air goals which may be attained in 1975 or shortly thereafter will be violated by 1985.

Quantification of the maintenance problem, therefore, requires forecasts of emissions and associated air pollution levels in 1980 and 1985. Emission forecasts must be derived from a combination of current emission inventories, air pollution monitoring data, econometric projections, and anticipated land use and transportation patterns. The above-referenced promulgation by the Federal EPA of guidelines for a non-significant deterioration policy further complicates the air quality management process. Whereas formerly national primary and secondary air quality standards were the fixed targets (of course, states could always enact tighter standards), Federal procedures proposed in August 1974 would arbitrarily set tighter standards in those areas currently enjoying superior air quality and require public hearings to consider either returning the standards to their original levels or further tightening them. Public hearings on this matter must therefore consider the tradeoff between superior air quality and less constrained regional growth. Unquestionably, geographically-dependent air quality standards which impose unusually strict control requirements on new industries in "clean air zones" will generally force such industries to locate elsewhere.

Data requirements for the quantification of the maintenance problem as shown in Figure 1 reflect the need to understand current air quality problems and other regional characteristics in order to assess the potential for future problems and evaluate alternative strategies. Analysis of the current air quality situation typically involves the application of dispersion models relying on inputs of air quality data and a current emission inventory. The challenge of forecasting emission levels, whether by a crude county- or region-wide approximation or by the more detailed sub-county allocation of emissions, employs econometric projections and other planning documents which have not generally been designed for the purpose intended here and which often require special tailoring to facilitate air quality analyses.

Of special interest is the task of specifying air quality goals in a context of recently proposed EPA guidelines for nonsignificant deterioration. Figure 1 reflects the fact that decisions to toughen and/or relax air quality goals in selected portions of a region must be made via public hearings in accord with evidential procedures. A full documentation of the air pollution potential of current plans for regional growth as well as the economic and social implications of changes in such plans which might follow from the imposition of alternative air quality standards may be required. Thus, Figure 1 identifies land use maps and public perception surveys in addition to extensive air quality and emissions data.

Design and Implementation of Maintenance Strategies

This section considers four categories of strategies which can be employed singly or in combination in accord with the degree of problem and the nature of regional preferences. Strategies will vary significantly as to ease of design, suitability for regulatory control, degree of effectiveness, and the character and/or geographical location of those persons bearing the greatest burden. The following subsections consider four basic air quality maintenance strategies: source controls, indirect source reviews, emission density zoning, and explicit limits on regional or subregional growth. The discussion herein of each option is intended mainly to provide sufficient understanding to relate that option to data requirements in Figure 1.

Source Controls

New Source Performance Standards (NSPS) promulgated by the Federal EPA in accord with Section 111 of the Clean Air Act Amendments of 1970 represent the most advanced state-of-the-art in pollution control for major industrial sources of particulates, sulfur-dioxide, oxides of nitrogen, hydrocarbons, and carbon monoxide. These pollutants, for which national air quality standards have been promulgated, must be considered in evaluting the maintenance problem. Regulations limiting emissions of hazardous material (e.g., beryllium, asbestos) in accord with Section 112 of the Act are vital aspects of the national air pollution control effort but will not have measurable impact on the air quality maintenance problem. Control over vehicular emissions is essential for attaining carbon monoxide, hydrocarbons,

FIG. 1 - AIR QUALITY MANAGEMENT DATA MATRIX

STEPS IN THE AIR QUALITY MANAGEMENT PROCESS

DATA REQUIREMENTS (SOURCE CODE)			QUANTIFICATION OF THE MAINTENANCE PROBLEM					DESIGN AND IMPLEMENTATION OF MAINTENANCE STRATEGIES: SOURCE CONTROLS				DESIGN AND IMPLEMENTATION OF MAINTENANCE STRATEGIES: INDIRECT SOURCE REVIEW		DESIGN AND IMPLEMENTATION OF MAINTENANCE STRATEGIES: EMISSION DENSITY ZONING				DESIGN AND IMPLEMENTATION OF MAINTENANCE STRATEGIES
			DISPERSION MODEL DESIGN AND VALIDATION	ANALYSIS OF CURRENT REGIONAL AIR QUALITY	FORECAST EMISSION LEVELS 1980, 1985 COUNTY- OR REGION-WIDE	FORECAST EMISSION LEVELS 1980, 1985 SUB-COUNTY DETAIL	SPECIFY AIR-QUALITY GOALS-NONDEGRADATION	POINT-SOURCE CONTROLS (NSPS)	HAZARDOUS MATERIALS CONTROLS	VEHICLE EMISSION CONTROLS	AREA-SOURCE CONTROLS	SOURCE-BY-SOURCE	COMPLIANCE WITH COMPREHENSIVE REGIONAL PLAN	LAND-USE (LU) FORECASTS	EVALUATE ALTERNATIVE LU PLANS	SELECT PLAN & ASSOCIATED EMISSION DENSITY LIMITS	IMPLEMENTATION/MONITORING	EXPLICIT LIMITS ON REGIONAL OR SUB-REGIONAL GROWTH
AIR QUALITY MEASUREMENTS		CO (EPA)	A	C				O				C	C		C			C
		HC, NO_2, O_3 (EPA)	C	C				O					B		B			B
		SUSP. PART., SO_2, (EPA)	A	A			A	O			A				A			A
		BACKGROUND SUSP. PART	A	C			C	O			C				C			C
METEOROLOGICAL DATA		MIXING HEIGHT AND WIND ROSES (NWRC/EPA)	A	A				O	O			A	A		A			A
		INSOLATION (NWRC/EPA)	B	B				O					B		B			B
		STAGNATION FREQUENCY (NWRC/EPA)	A	A				O	O			A	A		A			A
		ANOMALIES (e.g. SEA BREEZES) (EPA)	D	D			D	D	O				D		D			D
		TOPOGRAPHY (RPC/EPA)	D	D			D	D	D			D	D		D.			D
EMISSION INVENTORY - CURRENT		POINT SOURCE CHARACTERISTICS (EPA)	A	A	A	A	A	O					A		A			A
	MAJOR TRANSP. LINKS (LTD. ACCESS HWY)	ADT (DOT)	A	A	A	A	A					A	A		A			A
		VEHICLE MIX-AGE, TYPE (DOT)	A	C	A	C	C					C	C		C			C
		AVERAGE SPEED (DOT)	C	C	A	C	C					C	C		C			C
	AREA SO_2, PARTICULATE, HC & NO_2	SOLID WASTE (RPC/EPA)	A	C	A	A	A	O			A		A		A			A
		VEHICLE VMT/SPEED (DOT)	A	C	A	A	A						A		A			A
		VEHICLE DIST. (LDV, HDV, HDD) (DOT)	C	C	A	A	A					C	A		A			A
		R/C FUEL COMBUSTION (RPC/FPC)	A	A	A	A	A	O			A		A		A			A
		FUGITIVE DUST (ROADS/STOCKPILES) (EPA)	D	D	D	D	D	O			D		D		D			D
		MISC. INDUSTRIAL PROCESS SOURCES (EPA)	A	C	C	C	C	O					C		C			C
EMISSION INVENTORY - FORECAST ([illegible])	INDUSTRIAL GROWTH	OBERS PROJECTIONS (BEA)			B	C	C						C	C	C	A		C
		EMPLOYMENT LEVEL PROJECTIONS (BEA/RPC)			B	C	C						C	C	C	A		C
		MAJOR POINT SOURCE PLANS (RPC/Ind)				E	E						E		E			E
	FUEL COMBUSTION	CENSUS TRACT DATA/PLANNING ZONE DATA (RPC)			B	B	B						B	A	B			B
		MAJOR POINT SOURCE PLANS (RPC/Ind)				E	E						E	E	E			E
		MAJOR TRENDS IN FUEL USE (RPC)			A	C	C						C	A	C			C
		ELECTRIC UTILITY Co PLANS (FPC/Ind)				A	A						A	A	A			A
	TRANS-PORTATION	DEMOGRAPHIC PROJECTIONS (RPC)			B	A	A						A	A	A	A		A
		COMPREHENSIVE TRANSPORTATION PLAN (RPC/DOT)			B	B	B						B	A	B	A		B
INDIRECT SOURCE REVIEW		MAXIMUM 1-AND 8-Hr INDUCED TRAFFIC (Dev)										B	B					O
		ROAD MAPS, ADT, SPEEDS (DOT)	B	C								C			C			C
		DISTRIBUTION OF INDUCED TRAFFIC ON NEARBY ROADWAYS (Per)										O						O
		PARKING LOT LAYOUT (Per)										B						
		PDU OR OTHER PLANS (Per)										B					B	A
		LATENT TRAFFIC DEMAND (FOR NEW ROADWAY) (DOT/RPC)										X					X	X
		COMPLIANCE WITH REGIONAL PLAN (?) (RPC)											X					
		PUBLIC TRANSPORTATION SYSTEM - MAPS, CAPACITY, SCHEDULES, UTILIZATION (RPC/DOT)					B					A	A	A	A	A	A	A
EMISSION DENSITY ZONING		RESOURCE & LAND USE MAPS-EXISTING (RPC)				O	B						B	B	B	B	B	A
		PUBLIC PERCEPTION SURVEYS (RPC)					E						E			E	E	E
		LAND-USE MAPS - ALLOC. OF UNDER-DEVELOPED LANDS (RPC)				O	X						O		O	O	O	O
		LAND-USE BASED EMISSION INVENTORY (EPA/RPC)				O	O						O		O	O	O	O
GOVERNMENTAL REVIEWS/REGULATIONS/CERTIFICATIONS		AIR POLLUTION PERMITS-NEW SOURCES (EPA)				A	A	A	A								A	O
		AIR POLLUTION PERMITS-INDIRECT SOURCES (EPA)				X	X					X	X				X	O
		NPDES PERMITS (EPA)															A	O
		A-95 REVIEW (RPC)															A	A
		UTILITY CONNECTION PERMITS (FPC)												B			A	O
		ENVIRONMENTAL IMPACT STATEMENTS				A	O					D	O	O	D		D	D
		LAND-USE ZONING REVIEW											A				A	A

TABLE 1

SOURCE CODE FOR FIGURE 1

BEA — Department of Commerce, Bureau of Economic Analysis, and other Federal agencies with responsibilities for national and regional econometric projections

DOT — Federal, state, and/or local departments of transportation

EPA — Federal, state, and/or local environmental protection agencies responsible for environmental control

FPC — Federal Power Commission and/or state public service commissions

Ind — Industries and Trade Associations

NWRC — National Weather Records Center, Asheville, N. C.

Per — Permit application filed in accord with Federal and/or state environmental protection regulations

TABLE 2

DATA QUALITY CODE FOR FIGURE 1

A — Normally available with sufficient accuracy and geographical detail

B — As under "A" but often requiring special tailoring for air quality analysis

C — Normally available with sufficient accuracy but often with insufficient geographical detail

D — Occasionally available and often requiring special tailoring for air quality analysis

E — Generally not available; very difficult to acquire

X — Data required—no opinion as to availability and/or accuracy

O — Optional

nitrogen oxide, and photochemical oxidant standards in many major metropolitan areas. For example, recent indications that the Federal EPA will move to drop the NO_X emission standards, coupled with decreasing levels of SO_2, may make it virtually impossible for some areas of the country (e.g., Los Angeles, Chicago) to attain suitably low levels of ozone and other photochemical oxidants.

Area-source controls include restrictions on open burning and residential fuel-use (e.g., effectively banning coal and residual oil in residential and commercial buildings within a central business district) and requirements for control of fugitive dust emissions from stockpiling and transfer of materials.

Certainly direct controls over emissions from point- and area-sources will be a part of any maintenance strategy. However, as it is extremely difficult to predict the location and intensity of new industrial activity, it is correspondingly difficult to anticipate the effectiveness of, and therefore rely exclusively on, a maintenance strategy based upon such controls. Therefore, in major urban and industrial areas of the country, the air quality management program must rely on a combination of direct controls over new sources and one or more additional strategies closely related to the responsibilities of regional planning agencies.

Data requirements for point-source controls as indicated in Figure 1 reflect the desirable option of redoing appropriate dispersion analyses with each proposed source added to the emission inventory. Alternatively, one can update the air quality analysis annually and, by hand calculations, superimpose proposed point sources onto the known, current air pollution profile.

No specific data requirements have been identified in Figure 1 for the column "Vehicle Emission Controls," reflecting the fact that this program is administered almost entirely by the Federal EPA except for vehicle retrofit requirements in a few regions of the country (e.g., Los Angeles, San Francisco, New York, Denver). Further, the analyses necessary to defend the need for imposition of such retrofit controls have already been performed.

Indirect Source Review

An indirect source is "any building, facility, plant, auditorium, or other structure or combination thereof, or any road or highway which causes or contributes to air pollution through the attraction of mobile air pollution emission sources." Following the decision by the D.C. Circuit Court in February 1973 (NRDC vs. EPA, 475S. 2d968), all state implementation plans must include procedures for the review of proposed indirect sources as well as authority to prevent the construction of such sources if they threaten a violation of the national ambient air quality standards.

The analysis of an application for permit to construct an indirect source generally entails calculations of projected air pollution levels at locations in the vicinity of the source where persons might be exposed for periods in excess of one hour. Knowledge of the traffic induced by the source and its impact on nearby roadways as well as on property adjacent to the ingress, egress, and parking facilities at the source itself requires a combination of projections of business activity, vehicular activity independent of the proposed source, and the interaction of the new induced traffic on the existing situation.

Indirect source regulations recently promulgated by the Federal EPA look at carbon monoxide levels. This "source-by-source" review focuses on a problem of localized nature in contrast to the region-wide characteristics of any control program dealing with oxides of nitrogen and photochemical oxidants. There is little experience to date with the accuracy of many of the data elements and associated calculations (e.g., distribution of induced traffic on nearby roadways). Further, too few permit applications for indirect sources have been filed for me to comment on the quality of their informational contents. Note that "Environmental Impact Statements" in Figure 1 is scored with a "D" reflecting generally inadequate analysis of the regional-growth and air-quality implications of major public works projects.

A more farseeing approach to the review and permitting of indirect sources, one which addresses most vehicular pollutants, ties the approval process to a comprehensive regional plan. If such a plan is promulgated by a qualified regional planning agency **and** if such plan is shown by appropriate analytical models to be in compliance with clean air standards, then the indirect source review becomes primarily one of determining whether or not the proposed indirect source is in conformity with an approved comprehensive regional plan.

This latter approach to indirect source review is significantly more ambitious, as indicated by the data requirements identified in Figure 1. However, the permitting process is greatly simplified once a comprehensive regional plan or even a regional transportation plan has been analyzed and approved from an air quality viewpoint and then formally adopted by the regional authorities.

Emission Density Zoning

Emission density zoning represents one of the most comprehensive and potentially effective strategies for the long-term maintenance of clean air standards (Roberts and Croke, 1970). In its purest form (there are variations such as "emission allocation" [Hagevik, 1974]), the following steps must be performed:

1. Air quality standards must be set for the region. They may be uniform (e.g., national ambient air quality standards) or geographically dependent (e.g., protecting clean areas and designating zones of higher pollution where heavy industry will be encouraged to locate).
2. One or more land use plans identifying as a minimum zones of heavy industry, light industry, electric utility sites, residential/commercial development, and park lands must be developed.
3. Models of atmospheric dispersion are then employed to identify allowable emission density limits for each land use classification. The analysis is repeated for alternative land use plans. An emission density limit sets the maximum emissions of a given pollutant from a plant or activity in terms of pounds per unit time per unit area encompassed by the plant or activity.
4. A final regulation (i.e., land use plans and set of emission density limits) is selected following analysis of the relative merits of alternative plans. There is opportunity here for opinion surveys quantified by decision-theory methods. Also, optimization techniques such as linear programming can be applied to select "best" emission density limits.
5. A market in air pollution emission rights may be established.

The principal steps in designing and implementing an emission density zoning program are highlighted by four columns under this heading in Figure 1. In general, the first two columns, "Land Use Forecasts" and "Evaluate Alternative LU Plans," are seen as similar in their data requirements to "Compliance with Comprehensive Regional Plan" under "Indirect Source Review."

I have chosen to distinguish between these two strategies by limiting the indirect source review to induced vehicular emissions, whereas the emission density zoning strategy considers all pollutants for which national ambient air quality standards have been promulgated. Emission density zoning thereby would subsume the indirect source review except where such review focuses on highly localized concentrations of carbon monoxide.

Data requirements for the evaluation of alternative land use plans in terms of environmental and socioeconomic impacts are extensive in that they imply analysis of current and alternative future air quality profiles. In choosing among alternative land use plans, a "Land-Use Based Emission Inventory" is optional but highly desirable. Such an inventory relates emissions (pounds per hour) from existing sources in developed areas to the land occupied by those sources. Distributions of pollution potential as a function of land-area occupied, parameterized by land use and/or standard industrial classification (2-digit), are thereby generated. These data along with parallel correlations between, for example, gross revenues and land area are necessary for optimization studies.

Explicit Limits on Regional or Sub-Regional Growth

When regional planners develop and evaluate alternative futures, they may employ as exogenous variables employment, population, and other measures of activity which in reality follow endogenously from transportation and land use patterns, whether controlled in accord with a master plan or simply evolving from fragmented political decisions. It may be practical (and in some cases constitutional) for municipalities, counties, and even regions to set explicit limits on population, employment, and other key parameters in the planner's equation, either by direct ceilings on such parameters or by ceilings implicit through limitations on services such as utility connections and transportation services or by special zoning restrictions. Here, in contrast to emission density zoning, the air pollution benefits are secondary to broader attributes of an enforceable, comprehensive regional plan.

Data requirements for this category of utopian strategies are quite broad. Figure 1 assumes that some form of benefit/cost balance is attempted, probably with environmental pollution as one factor. Implementation and monitoring is anticipated via zoning and utility-connection approvals, and possibly environmental protection permits.

FOOTNOTES

[1] This paper is of professional interest to officials of air pollution control agencies and state and regional planning commissions who together must design and implement strategies for the maintenance of clean air goals as an integral part of the comprehensive regional planning process. The paper identifies principal data requirements at each stage in the solution of the air quality maintenance problems.

[2] I am appreciative of the advice provided during the construction of Figure 1 by R. Cirillo, T. Baldwin, and J. Tschanz of Argonne, whose work related to the topic of this paper is sponsored by the EPA Office of Air Quality Planning and Standards.

[3] Indirect Source Regulations under consideration by the Illinois Pollution Control Board.

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Comments

David H. Moreau
University of North Carolina at Chapel Hill

Mr. Roberts is to be congratulated for preparing a well-organized paper and for an interesting discussion on emission density zoning. The matrix presented in the paper is a very useful format for summarizing information needs.

Since the author has chosen to emphasize emission density zoning strategies in his presentation, I will limit my remarks to that process and related information needs, especially those from land use planners. He represents the air quality management process as consisting of four basic steps:

1. Adoption of air quality standards
2. Development of one or more land use plans

3. Application of atmospheric dispersion models to identify "allowable" emission density limits for each land use classification for alternative land use plans, and
4. Selection of a "final regulation" following an analysis of relative merits of alternative plans

The paper gives scant attention to what constitutes "merits" of alternative plans and information requirements to estimate those merits. Furthermore, the reader is left with the impression that air quality management will select the "final regulation." The author states that: "Data requirements for the evaluation of alternative land use plans in terms of environmental and socioeconomic impacts are extensive in that they imply analyses of current and alternative future air quality profiles." Evaluation of alternative land use plans indeed will require extensive information, but it will require much more than environmental, economic, and social well-being benefits and costs as they relate to air quality. They must display at least environmental quality, economic, social, and public health impacts (both beneficial and adverse) of all actions and behavorial responses necessary for realization of alternative land use configurations. If air quality management strategies are specified for particular land use patterns, then a "final regulation" for air quality management cannot be chosen without at least an implicit selection of a land use configuration. Achievement of any one of the alternative land use configurations will require actions to which consumers of urban space will respond, thereby generating benefits and costs to several societal objectives. It seems to me that air quality planners are in a poor position even to formulate management strategies, let alone recommend a course of action, in the absence of such extensive information.

This difficulty is not unique to air quality management. Section 208 of the Federal Water Pollution Control Act of 1972 calls for similar land use controls for both point and non-point sources of water pollution. This section of the Act has only recently been implemented by EPA; the Research Triangle Area of North Carolina was the first area in the United States to be designated for 208 planning, the designation coming in the spring of 1974. There is no land use plan for the area to which participating governmental units are strongly committed. In the absence of such plan, estimation of locations, types, and quantities of point and non-point loads to which water quality management must address itself is a very uncertain undertaking at best. The formulation and evaluation of alternative land use plans and development of consensus in support of one alternative would be heroic undertakings under water quality planning.

There appears to be no satisfactory resolution of this difficulty short of parallel land use planning and the development of effective guidance instruments to effectuate those plans. However, in the absence of such plans or planning activities, environmental planners could well concentrate their efforts on two activities: (1) identification of critical locational decisions of major significance to environmental quality; and (2) cooperative efforts with land use planners, affected public and private development interests, and the public to identify locations and control strategies that are mutually acceptable to interested parties. After all, it is not so important that the process predetermines all future decisions with respect to land use and environmental quality as is the avoidance of bad decisions that have either irreversible impacts or impacts that can be reversed only at very high costs.

Session V

Invited Comments And Conference Summary

Chairman:

Jonathan B. Howes,
University of North Carolina
at Chapell Hill

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Invited Comments

Diana H. Wahl
League of Women Voters Education Fund
Washington, D.C.

A few thoughts have occurred to me as I sat through these meetings. The overall feeling I am left with reminds me of the story of the man who fell out of the window on the 50th floor of a building. As he is plummeting to the ground, someone on the 30th floor yells out to him as he is hurtling by, and asks him how he's doing. "So far," he says, "I'm okay."

On the basis of what has been said about the Clean Air Act at this meeting, I begin to think that the Clean Air Act is that man. So far, it's okay, but it's fast approaching the bottom. It is not a heartening sight.

Let me briefly make a couple of points.

One—Citizens are going to be watching what all officials—Federal, state, or local—do in terms of implementing the Clean Air Act. Many citizens—most, I believe—support wholeheartedly the Clean Air Act. I do not believe that many people are actually disconnecting pollution control devices from their cars—and if they are, it is because they have been sold a bill of goods by various industries. So—we will be watching you. You, in turn, should expect—and demand—that citizens participate, that citizens comment on rules, that people show up at hearings, that people make their feelings known.

Two—EPA has got to do a better job selling its rules and regulations. I agree wholeheartedly with the people at this meeting who complain about the carelessness with which the Agency has operated. If EPA wants support for its programs, it had better make sure it explains carefully and rationally and completely exactly what the program means, what is expected of people, etc. And EPA is going to have to sell better not just to citizens, but also to government and industry alike.

Three—I think that critics of policies such as parking management, VMT minimization, and non-deterioration ought to look at their arguments against those rules very carefully. Without going into detail here, it is clear that those policies need not affect center cities at all—they can only help, if properly im-

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plemented. It is ludicrous to say that EPA is encouraging sprawl and chaos.

Four—this meeting has been characterized by an awful lot of jargon—talk about trade-offs, matrices, etc. Lest we get so involved in our words that we forget what the issue is all about, we had better remember that there are a couple of reports circulating on the health effects of various pollutants if deadlines are not met. This is not a question of frills or icing on the cake. This is human health.

Five—no one has talked very much about energy. No one seems to be making the connections between the environment, clean air, and energy. If we started to think in terms of energy conservation—with substantive conservation measures—we would find ourselves far less plagued with clean air worries, far less likely to blame EPA for difficult, knotty rules that are virtually impossible to meet. What this means, then, is that we have got to keep pushing policy-makers to remember those energy ramifications so that we can kill—or save—two birds with one stone.

Six—a lot of people at this meeting have been talking about planning developments and meeting air quality rules on a project by project basis. They have been saying that national standards are ludicrous and meaningless, that every area has its own needs.

It seems to me that piecemeal review can only have bad results. It means we will never be able to develop comprehensive land use plans. It means that we will never be able to develop comprehensive air quality maintenance plans. It means that all these rules—instead of pointing to some form of rational growth—will just represent large stumbling blocks over which the developer and public official and citizen must climb every time there is a new project proposed, a new development.

Finally, **seven**—at least one speaker talked about the need for air quality regulations to be reflective of local needs, and he went on to suggest that emissions levels could reasonably be set by local, appointed officials. This is ludicrous. I refuse to let the appointee of a governor—a governor who has little interest in the environment—tell me how much sulfur dioxide can go into the air. Little more needs to be said about that suggestion. Suffice it to say that I want those decisions made on the basis of scientific data, and not because of the amount of money an industry contributes to a governor or the influence it has.

Invited Comments

Norman L. Cooper
Office of the Secretary of Transportation
Washington, D. C.

First, a word of commendation to those who organized and managed this conference, including Maynard Hufschmidt, Larry Kornreich, Debbie Powell, and those behind the scenes. Especially valuable was the written advanced direction to speakers which helped keep the conference on target.

Maynard Hufschmidt's statement opening the conference was supported throughout the two and half days of discussion. He said the Federal government is coming down uncoordinated on air quality/transportation/land use, and the locals must coordinate and put together these programs. While efforts should be and are being made to mesh Federal programs, this will never satisfactorily be achieved because of the nature of our Federal system. For the Federal government and for the larger states, the programs are too complex and the institutions are too large to avoid categorical treatment without satisfactory coordination. For the foreseeable future, the burden of meshing these programs into rational action will, and I believe should, rest on decentralized institutions. But there are actions that can be taken at the Federal and state levels to better enable local institutions to coordinate and implement these programs. Specific recommendations to do this follow, based on my attempt to distill apparent conference consensus.

New legislation and amendments to existing legislation are suggested as the most effective means to meet the institutional needs which permeated conference discussion.

New Federal legislation should be enacted which would mandate the governors to designate single metropolitan entities for the urban planning now mandated by some 24 Federal programs, including air quality, transportation, and land use planning. Where states fail to act, the Office of Management and Budget should be authorized to make such designations.

Such legislation should include language that would put Federal agencies and the larger state governments more in a mode of providing support and technical assistance, enabling maximum transfer of evaluating and decision-making actions from Federal and state agencies to metropolitan entities. This legislation should also include a mandate for an open process of planning and decision-making involving local governments and citizens. The legislation should link planning to implementation through conditioning all Federal funding programs to conformity with the metropolitan plan, as determined by the designated metropolitan entity and subject to state and Federal appeal.

As discussed throughout the conference, there should be early enactment of land use policy legislation at the Federal and state levels. This legislation should include prescription of institutional relationships, as above.

The Clean Air Act should also be amended to prescribe the above institutional relationship. The Clean Air Act should be amended to postpone the date for achieving ambient air quality standards in the small number of major metropolitan areas where extensive reductions in vehicle miles of travel would cause severely adverse socioeconomic effects. The Clean Air Act should not be amended to further reduce the number of strategies available for inclusion in transportation control plans. Consideration should be given to restoring those strategies deleted from EPA use, e.g., parking surcharges.

A conference on Federal and state air quality/transportation/land use legislation is recommended, including more representation by private sector and citizen organizations.

Concerning Federal and state management of these programs, there is need for a strong shift away from Federal involvement in selection of options to meet standards. Much more of the Federal and state effort should be directed toward strengthening metropolitan institutions and providing technical assistance to enable these institutions to evaluate alternative strategies, select optional combinations of strategies, and implement them. There is need for a stronger Federal focus on developing evaluative tools, e. g., air/transportation/land use models for application to the metropolitan system and to the transportation facility.

There is need for a stronger public information program on the health effects of air pollution.

Separate conferences similar to this one are recommended which would target on legislation, regulations, and system evaluation models.

Invited Comments

Linda Goldman
Office of Transportation and Land Use Policy
Environmental Protection Agency

I have ten minutes to express my views on the major issues raised during this conference. First, however, I should probably explain to you a little about the office I come from in EPA. The Office of Transportation and Land Use Policy is responsible for the implementation of Transportation Control Plans, which include Parking Management and Indirect Source Review. I am in the Land Use Branch, which investigates the land use and institutional aspects of the Air Quality Maintenance and Significant Deterioration programs. It also helps coordinate the air and water programs, especially in terms of the land use impacts of those programs.

I would like to preface my comments with a brief observation on the much-discussed subject of the Clean Air Act and institutional problems. I think we can expect guidance from Congress on this issue next spring, which is when we anticipate a broad Congressional review of the Act. I believe that guidance will expand the role of local government in the national air pollution program.

Last evening, as I reflected on the past two days of discussion, I realized that my task of summarizing the conference in 500 words or less would not be as formidable as I had initially thought. As it turns out, most of the issues that have been discussed at the conference are reflected in the Air Quality Maintenance process. So I would like to review that process with you. I think you will find its conceptual framework both informative in itself and helpful as a device for organizing your own conclusions about the areas discussed here.

An adequate Air Quality Maintenance Plan (AQMP) will necessitate modifications and extensions of existing State Implementation Plans (SIPs). The AQMP will serve as an impetus for revision of the SIP into a continuing statewide overview planning process that involves both attainment and maintenance of air quality standards. This statewide overview should become the conceptual and analytical framework for integrating existing and proposed air pollution control measures for both attainment and maintenance.

In areas where projected violations of air quality standards are not severe, modest revisions to existing SIP requirements may be sufficient to insure maintenance of National Ambient Air Quality Standards (NAAOS). However, if the standards cannot be attained and maintained through such revisions alone, the state must initiate the complex planning and implementation process needed to develop an AQMP for problem areas. This process involves critical linkages with other agencies and numerous institutional options for providing a continuous flow of information about and review of the impact new development is having on emission levels. Its final step is the designation of measures to mitigate this impact.

Although maintenance of air quality standards is a straightforward goal, the implications for air quality planning and management are quite far-reaching. This long-range continuing planning process is designed to insure that air quality considerations are integrated into community decisions on future growth and development. In fact, the AQMP process will assist communities in managing future growth by effectively integrating air quality constraints into planning and decision-making processes at all levels of government. As such, the AQMP is not a growth control but a management device. In sum, Air Quality Maintenance will serve to define air quality constraints within which a community can change and grow but still maintain national standards, thereby protecting the public health and welfare. Trading off between projects that will impact unfavorably on air quality is an important mechanism in this process. For this reason, it is essential that the general public and concerned interest groups become involved in identification, evaluation, and approval of various regulatory measures comprising the overall Air Quality Maintenance strategy to assure that they are consistent with overall public policy goals in the community.

Success of the AQMP process is dependent upon effective coordination and integration of various functional bodies at different levels of government. This process involves coordination of transportation, land use, environmental, and all other considerations which impact on planning and growth. Air quality considerations must be successfully integrated into both the planning and decision-making procedures of the parties responsible in all of the above areas. Likewise, authorities responsible for land use, transportation, and other environmental functions must be integrated into the AQMP process in order to assure that all plans are consistent and that the maintenance plan can be implemented successfully. In addition, the maintenance planning must provide for a constant interaction of the various participants as well as a continual update and review of the plan itself.

Each state must choose an institutional framework for execution of the AQMP process. This framework should incorporate all of the considerations mentioned above. In addition to selecting the level of government participation, the choice involves a decision on which groups should participate in or coordinate with various aspects of the overall planning/management/regulatory process. Single-purpose bodies (e.g., air pollution control agencies, transportation planning boards) and multi-purpose units (e.g., Council of Governments, city/county governments) at various governmental levels will have to become involved to some degree. Choice of a suitable framework for a particular area depends upon institutional framework existing in the state and local area as well as traditional state/local relationships. However, regardless of the particular structural framework selected, the initial planning process must involve participation by those who will have ultimate authority for implementation and enforcement of the plan.

Because the AQMP is considered a part of the SIP, primary responsibility for plan development rests with the agency designated by the Governor. Delegation of authority for plan development could occur at any level and to varying types of agencies. The responsible agency can be at the state, local, or regional level; and it can be single- or a multi-purpose body. In some areas, regional planning groups would be best qualified to coordinate the maintenance planning process. In other areas, perhaps city and/or county governments, air pollution control officials, or state officials could perform this role more effectively. In each situation, the responsible agency must be in a position to insure coordination with all the other participants.

In conclusion, I think you can see that the AQMP does bring together all current air pollution control efforts—Indirect Source Review, Transportation Control Plans, New Stationary Source Review, the Federal Motor Vehicle Pollution Control Program among them. What it yields is a comprehensive mechanism for managing air quality.

Invited Comments*

Everett Knight
N.C. Office of Water and Air Resources
Raleigh

Perhaps I am a little bit out of place in this group—I am one of those state bureaucrats who is responsible for the administration of environmental programs, and perhaps my view relative to some of these problems may be somewhat different from others who are not quite as directly involved in these matters as I have had to be over the last several years. I notice that I have one other counterpart in this group coming all the way from Colorado. I do not see any of the others.

My particular area of responsibility is the Assistant Director for the Division of Environmental Management of the North Carolina Department of Natural and Economic Resources. I have the responsibility for the overall administration of the State's environmental programs which include the water quality control program, the air quality control program, the sedimentation and erosion control program, the mine reclamation program, and another one which relates to the safety of dams. So I think we in this State have at least recognized the fact that in the final analysis the administration of these programs is in fact a land use planning tool. If you control where the sewer lines go, you likewise control where the people go; if you control where the shopping centers, the streets, and the highways go through your indirect source review program, you control where the people go. I think in the final analysis the implementation of all of these programs has to be related directly to the specific goals and policies of the governmental entity that is seeking to implement these programs.

Now in this State at the present time there is considerable discussion going on concerning what the policy of the State should be relative to growth. Once that policy has been established and has been determined, then all of the agencies of the State's government will be involved in the process of seeking to implement that policy. I hope that the policy of the State when finally expressed in this particular area will be one of controlled growth and that we will then be in a better position to implement the requirements of complex source regulations, the 201 and 208 facilities planning requirements as contained in the water pollution control statutes under 92-500. North Carolina is still primarily a rural state. We do not have a lot of the problems that other areas of the country have at this particular time; therefore I think our role in this area is more in the area of planning programs and implementing programs that will prevent the occurrence of these kinds of problems. I think the recognition of this need accounts for a part of the activities that have been going on in this State, particularly in the area of land use planning. We have already enacted in the State a comprehensive land use planning process that is applicable to the coastal areas of the State. This establishes the Coastal Resources Commission; that Commission has the responsibility for developing comprehensive land use plans applicable to those 20 counties. Additional legislation will likely be considered in the next session of the Legislature, so that these processes will ultimately, if all the legislation is enacted, establish land use planning processes for the entire State. It will be essential not only that air quality management considerations be taken into account in the development of these plans, but that all of the other environmental considerations enter into the picture at the same time. If we are to develop programs that will in fact result in an improvement in the environment for all of the people, we must not let the land use planning process be governed to any major extent by the considerations of a single environmental program, and I strongly support the view that if we are to get anywhere in this business we must establish the institutional arrangements that will allow due consideration to all of these factors. Once we do this, I am confident that we can achieve and maintain a better environment for all of our people.

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*Transcribed from taperecording of Conference sessions.

Invited Comments

Charles Z. Szczepanski
Office of Environmental Quality
U.S. Department of Housing and Urban Development

I would like to thank the organizers of this conference in a different way than normally. Following the speeches—the presentations—I was just delighted at the way our subject was growing and getting new dimensions. I think with all of us looking from specialized fields, we are coming to appreciate the comprehensiveness of the problem; to the conclusion that in reality none of the specialized agencies, none of the specialized programs, is able to solve the basic problem of managing the air resources for people; that we need a really comprehensive process. So I was really delighted by this richness of the program and I think for all of us it becomes clear that we cannot use short cuts, that we have to make the effort for a full-dimensional approach to air quality maintenance—air quality management. I see an essential difference between management and maintenance. Air quality maintenance planning is an activity directed toward satisfying existing air quality standards; air quality management is a long-range goal of the Clean Air Act, the provision of the best air quality for human use.

Whatever suggestions you have had from HUD, they were never aimed at contradicting or opposing implementation of EPA direct goals or EPA schedules. We are all for timely implementation of EPA deadlines. However, we are stressing as strongly as possible that at each phase we have to make a total effort for preparation of a comprehensive input. We cannot abdicate, we cannot over-simplify the process—for example, by using a land use element inadequately related to on-going comprehensive land use planning (usually the 701 program). Otherwise we would have much worse results than it is possible for us to have. The funds for air quality maintenance planning might in large part be wasted and the opportunity for improvement in the management of urban growth would be lost.

Now, a few practical remarks on the HUD 701 program, offering assistance to approximately 3000 communities in the United States. The present aim is the support of effective management of the communities. It is not assistance to make colorful drawings; it is assistance for overall management. The assistance is directed to the major or top local government official, and no longer to the director of planning. Its objective is to coordinate an entire variety, an almost endless variety, of activities and local needs.

At this point I am tempted to refer to some observations from European planning legislation, which I taught before joining HUD. When I look at the structure of the planning process in Europe, usually it appears that the comprehensive planning responsibility is assigned to the office of the Prime Minister. Most frequently physical planning and economic planning were initiated separately; now in most of the countries they are merged or are close to such a union. In any case, it is normally placed at the top level of the government, not as an equal to specialized programs, but designated to provide assistance in overall management and coordination. The HUD 701 grants have the same mission.

The issue of the structure of metropolitan government is one which everybody is wondering about. Listening to the problems of the San Francisco area, it is really difficult to understand how the city government is able to perform its functions and how it is able to achieve any progress to comprehensive planning and management. Once more the European example may be interesting. For a long time the Paris region in France belonged to three Prefectures (or States). It was very difficult to coordinate planning and growth. The Act of 1961 established the Paris District for planning, development, and management of the infrastructural operations. All the operations began to flow more efficiently. In 1965 the Plan for Paris Region was approved. Since then the implementation flows satisfactorily on the principle of satellite new towns. The Paris District Prefect is responsible to the Prime Minister. Returning to the San Francisco case—I agree with the principle proposed by Mr. Cooper from DOT, but in the American parliamentary system it may lead very slowly to the necessary strengthening of regional administration. It seems to me that the State could resolve the problem much faster. Maybe it would be possible to establish a second Lieutenant Governor. He could be elected to become the chairman of the metropolitan Council of Governments. If the necessity is great for fast improvement of coordination in the region, I wonder if the Governor does not have the authority to appoint his special representative regularly to assist the COG Council. In Washington, the COG seems to operate slowly but effectively. The governments of the member jurisdictions, after deliberation, move in the general direction agreed on in the COG Council or in the committees. It is true that the area counties may have less complex problems than San Francisco has. Nevertheless, a little more powerful COG system might protect all the qualities of voluntary association of governments and assure adequate progress in operations. The Californians without doubt will find the right way to achieve their objectives.

It is worthwhile to mention the problem of interpretation of the purpose of the Clean Air Act. On the one hand it seems that most of the people understand it profoundly, but on the other hand, quite frequently the interpretation is surprising. On several occasions it appears that the Act might have as its goal clean air only for the sake of the air. The text of the "purpose" definitely indicates that the air has to be protected for use by the people living in their environment. People spend most of their time in the towns or cities. Therefore, as Dr. Roberts and several other speakers made clear, the authority of the Clean Air Act and of the implementing regulations may be used, as it has been and we could almost say "must be," for implementation of comprehensive land use planning.

Now, the question of HUD funds. I have mentioned a few times that HUD funds can be used for coordination of environmental assistance and for environmental studies. This is what the new 1974 Housing and Urban Development Act says. This support is delivered almost without any constraint at the beginning of 1975 to the communities. They have to make a very simple application. This application should be supported by quite extensive studies (which in most cases would be completed before submission of the application), but the application itself is simple, and usually only five to six pages long. However, at the end of the year certain kinds of auditing will have to be done by HUD staff. How this auditing will be done we do not yet know. The basic question will be whether the supported activities were aiming at implementation of the objectives of the Act; whether the activities were helping coordinated growth in accordance with a comprehensive land use planning process. The annual report will be used by HUD as a basis for allocation of next year's grant. In private conversations I have noticed a comment: "Oh, if HUD really is asking us to make this kind of auditing, maybe we will use easier money, maybe we should not use HUD funds." I think that most of the communities may and should use Block Grants assistance and it will only help the community. It can lead to the most efficient use of our resources. The HUD auditing is only seen as a kind of "paternal" reminder, encouraging the best management of local government.

Invited Comments

John Tuteur
Napa County Supervisor
Napa, California

You must realize that I come from a region where the automobile contributes 80 percent of our emissions (by weight) and where CO emissions are greater than all others combined. For the San Francisco Bay Area, changing America's auto-dependent lifestyle is based on more than just air quality considerations. A recent Environmental Impact Report, prepared for the Metropolitan Transportation Commission's Regional Transportation Plan, cited many basic social and economic adverse impacts caused by long home-job commutes typical of low-density metropolitan development. Included were racial and economic class segregation as middle class whites fled the inner cities; premature and unnecessary conversion of prime agricultural, open space, and recreational lands to urban use; and wasteful and expensive energy consumption patterns. It is in this broader socioeconomic context that I believe growth and environmental management questions must be posed.

As we enter the era of hopefully coordinated land use, transportation, and air quality (and other natural resource) policies, I am encouraged by several developments:

1. Economic, social, and energy constraints on America's lifestyle are becoming increasingly apparent
2. A growing sophistication of local electorates about growth issues and a new willingness of local officials to cooperate on metropolitan problems
3. A real sense of national urgency about the deterioration of our environment, both physical and socioeconomic.

However, as the old joke goes, now I have some bad news:

1. A failure in the environmental movement to recognize or deal with underlying causes—fiscal and social problems brought on by mortgage, taxation, and social policies that have hastened inner city decay, racial tension, and maldistribution of income. No amount of regulation (such as emission density zoning, or emission controls) or single purpose solutions

(such as increased transit) will affect metropolitan growth patterns fostered by such policies

2. The inability to date of changing the American expectations of what constitutes the good life (suburban living) because, in part, attractive urban alternatives have never been offered
3. Slow progress in changing national priorities away from profits, defense-spending, and material consumption.

Policies are our major hurdle, not institutions. Local governments are becoming more responsive and responsible as new people are attracted to the political level closest to the people. As an example, more than half of all County Supervisors serving in California have been elected in the past four years. In addition to the great flexibility and diversity of locally implemented solutions, local issues are the ones constituents are closest to. It is also at this level that resistance is greatest to "getting out of cars" and "high density living." If these battles are going to be won, this is the battlefield. At the same time, organizing on such issues as tax reform, equitable social policies, and funds for transit and the central city can be rewarding on a neighborhood basis as long as the results are not seen as directly threatening the residents' own interests.

Local politicians are already aware of the great power they wield and they are becoming educated to the fact that on the other side of an open-space fight to stop a subdivision is the need to find center city, attractive, safe living space. We need help from people with creative fiscal and social policy ideas as well as increased regulatory concepts such as ISRs, PMPs, and emission density zoning.

Let us not make it easier and cleaner for people to live in and move to the suburbs, but instead let us offer clean, safe, habitable inner cities to house today's underserved millions and most of the next 50 million Americans.

Invited Comments

Suzanne Wellborn
National Realty Committee
Washington, D. C.

THE DEVELOPER'S POINT OF VIEW

Each of the land use planning and management issues which have been raised and discussed during the past two days are of major concern to the development industry. A central point repeated throughout the conference has been the need for improved institutional arrangements and greater cooperation between the various sectors involved in land development.

The development industry is interested in increased cooperation and communication for two basic reasons. First, the development industry for its own purposes is seeking land use and environmental solutions to reduce congestion, insure adequate transportation, and encourage early planning to properly locate new development. Second, the solutions that are being sought by the environmentalists and Federal, state, and local officials will impact directly on the development industry. Since we are all involved in seeking solutions, cooperation rather than confrontation is a much better approach to finding solutions which are both effective and feasible.

Before increased cooperation and communication can take place, however, there are inaccurate conceptions about the development industry which must be corrected. The development industry is often regarded as the source of all environmental evils. The developer is characterized as a guy with unlimited financial resources and a single objective, to go out and mess up the environment. If people stop to think about it, they will realize that such characterizations are usually a surrogate for forces not adequately understood. Development is a force people do not understand, and because of this their response is to arrest and confine it. The sewer moratoria, bans on building permits, and similar local regulatory schemes, are indicative of this kind of response. The developer becomes the enemy in a holy war.

If we are going to try to find solutions to our environmental problems, it is important to understand the causes of development. There are two basic questions which should be addressed in an attempt to understand these causes: What need is the sinister force of development serving, and what is creating this need? A recent study by the Metropolitan Life Insurance Company reports that since 1970, 32 percent of all Americans have moved to a new residence. In metropolitan areas, cities with populations below 250,000 are expanding faster than medium size areas. The report also states that until the cities come to grips with population, crime, and shrinking job opportunities, the trend away from large urban areas will continue. Growth and change are only two of a variety of factors which cause development.

The explanation often used for the failure of public officials to deal adequately with these factors is the limited scope of authority in the Clean Air Act. In spite of this limitation of authority, however, growth and change should be taken into account. The Environmental Protection Agency (EPA) can advocate a point of view and influence these factors by taking a persuasive approach and by trying to integrate environmental concerns with these factors to the extent that growth and change occur within an environmental framework.

The development industry is interested in having the environmental regulations work as efficiently and effectively as possible. This is not only altruism on the part of the industry, it is self interest as well. The increased risks and costs of delays can be avoided if the developer knows what is required by the regulations. An element of certainty must be incorporated into the regulations.

EPA should realize that the overall success of the environmental program is contingent upon the effectiveness, efficiency, and ability to maintain that effectiveness and efficiency over the long term. It is just as important to carry through and perform a job well as it is to have the intentions to efficiently administer the regulations. The strength and longevity of a regulation lies in its administrative mechanism. Good regulations could be destroyed because they are not administered correctly, and the environmental program could ultimately fail because the regulations are not administered responsively.

What is at stake is the future of the environmental program for the environmentalist, the public officials, and the developer. Once we understand that we are in this together, better regulations and better administration of these regulations and programs become a common concern for the environmentalist, for

EPA, and for the developer. The development industry, for example, believes that eventually there will be an alternative to the automobile. The industry will follow the shift away from the automobile and start moving from the outer ring of the freeways and shopping centers back to the center of the urban areas. With the public sector acting under the same objective, development would actively seek to tie in with land use planning which would foster alternative land use patterns.

The Clean Air Act creates an impetus for the integration of transportation and land use planning. In addition, because of our energy shortages and economic problems, we know that the use of the automobile may not decrease for environmental reasons alone. What does this mean in terms of development patterns we want to foster? Future land use patterns should reflect environmental as well as energy-conserving forms of development. At least we ought not to go out and develop land use patterns which might well have a counter-effect. If development is to be brought in from the outer ring, EPA is going to have to devise regulations that create incentives for this type of shift. If people anticipate the shift, they will be better off than if they do not anticipate it happening.

If there is one thing that we have learned from this conference it is that transportation planning requires a long-range view and that results are not going to occur immediately. We need to develop regulations that induce a trend which can be influenced in the long run, for to anticipate mass transit can only be helpful. Furthermore, if there are going to be changes, the development industry should be made aware of these changes. Developers will make the shift; it would be senseless for them to do otherwise. If, for example, the opportunity existed to know that 20 to 30 years from now some form of mass transit system will serve a particular area, and if a developer had an option to locate his project near the proposed transit line, he would clearly choose the location which in the future will be serviced by mass transit.

The responsibility of environmental regulations is not to cause the change, but certainly not to impede it. A combination of other factors, including energy shortages, will actually cause the shift toward alternative development patterns. The best course of action is to influence the trend. Transportation policy, planning, and programming can be used as a means for reshaping cities and creating new land use forms in communities. Land use controls should be designed to allow for the kind of land development that can effectively reduce the need for automobiles. The following are a few development concepts which foster alternatives to the automobile:

1. An increase in large-scale, mixed-use development, with a variety of commercial, office, and residential uses;
2. A continuation of current patterns of large-scale, industrial parks, again with an increase in mixed-uses; and
3. Redevelopment of the center city.

The essential thing, which the developer, the environmentalist, and the people caught in the middle (namely the EPA), have got to do is to plan for development patterns which 20 to 30 years from now will be amenable to mass transit systems. Alternative land use patterns are not easy to achieve and require considerable thought in terms of anticipating the problems which might arise. For example, the current belief and practice is to dilute automobile emissions by dispersing development. It is extremely important to plan with some perspective on the integration of development patterns, which are being encouraged under current regulations, and possible future transit systems.

On the one hand we are talking about administrative responsibility and on the other hand about planning within an environmental framework. Even if everything we are doing now is wrong, as long as it appears to be the right thing to do environmentally and as long as it is well administered, the environmental program will survive. The indirect source regulations provide a good example. The expressed intent of the regulations is exactly what the developer has been trying to accomplish for years. The ultimate goal of the indirect source regulation is the ability to move cars in and out of shopping centers in a more efficient manner. To the shopping center developer, the goal is to get people off the roads and into the stores. There is basically nothing in the concept of the indirect source regulations that is antithetical to the developer's interest.

However, the development industry does have several concerns. First, the industry was not asked to participate during the early stages in the development of the regulations. The implications are significant: the environmentalists and public officials feel that the developer has nothing to contribute, cannot contribute, and is therefore not worth talking to. Second, the industry questions the effectiveness of the indirect source as well as the parking management regulations if the automobile emission standards are delayed. There are limits to the efficiency with which automobiles can be moved in and out of a shopping center. Finally, the industry's primary concern is the question of administration. In some communities where there is an attitude of controlled growth, these regulations will become the next mechanism by which to halt development. EPA has a responsibility to insure that the state regulations as well as local regulations have the right language in them, the statutory authority behind them, and that the state and local agencies have the professional capability to implement the regulations. EPA ought to be very cautious of the impact that state and local implementation has on EPA's ability to function in the future. Once a state takes over a program that is EPA-induced, EPA and the environmentalists will still be held responsible for the success or failure of the program. For example, as more states and localities begin to adopt their own indirect source regulations, EPA ought to make administrative provisions for the exclusion of any project for which an application has been submitted to EPA. That is, if a project is approvable under EPA regulations, then it should be granted an exemption under any newly adopted state or local regulation.

The indirect source review is a complicated process and there are serious questions as to whether or not the people administering the review will have the necessary professional competence. The states and localities must do a professional job. There is always the problem of the public official who makes his decisions on what he feels ought to be the outcome. He asks, "Do we or do we not need a new shopping center in this area?" If this answer is no, it does not make any difference what the analyses indicate, he will deny the application. The developer could appeal and he could win his appeal, but as a practical matter, the project will be dead by the time the developer wins his appeal.

In conclusion, the development industry recognizes that EPA is caught in the middle and that compromises have to be reached; the industry does not expect miracles. For the larger issues involved, a mutual understanding of the causes of development is important. With greater communication and cooperation, we can try to find effective and feasible solutions to our environmental problems. Environmental planning and management depends upon sound regulations, founded on long term objectives, and professional competence in the administration of those regulations. Unless EPA meets its administrative responsibility, the environmental program is not going to survive and all of use are losers, but what ultimately suffers is the concept of environmental planning and management.

Summary Remarks

F. Stuart Chapin, Jr.
University of North Carolina at Chapel Hill

My comments on the land use topic of this conference include both a summary of some of the key issues and some ideas for follow through.

First, it must be acknowledged that to date precious little attention has been given to air quality factors by land use planning agencies. Strategies for achieving clean air via land use controls do exist and might involve a combination of several actions. Einsweiler arrayed these from the politically most to the politically least sensitive measures: (1) limiting the magnitude of growth of metropolitan areas, (2) controlling the distribution of this growth, (3) regulating the intensity of land use, and (4) controlling the form and design of land development.

A number of metropolitan areas have been experimenting with these in the management of land use. Clearly, limiting growth offers the most difficult political problems and some tough legal questions as well. Although still posing some political as well as legal problems, controlling the distribution of growth is somewhat more acceptable. Thus, the location, sequencing, and timing of public investments can have a pronounced effect in steering development. Tax policy can also serve to steer land development—discouraging it in some directions and attracting it in others. Although not devoid of political sensitivity, but least controversial, is the use of such regulatory measures as zoning and subdivision control, including planned unit development. Used in combination as a growth guidance system, these land use management tools can be quite effective.

However, as brought out repeatedly during the conference, there are two practicalities that must be taken into account. One is the fragmented pattern of local units of government in metropolitan areas, and the other relates to the multiple objectives nature of the political decision-making process in metropolitan areas. Protection of public health which has been frequently cited, is a widely accepted objective. But there are others such as public safety and convenience, economic efficiency, social equity, resource conservation, and environmental quality. A vital part of the local decision-making process has to do with tradeoffs made among such objectives. If objectives are established remote from the locality (at the state or Federal level) and effectively removed from the decision-making process, options in the tradeoff process are considerably narrowed.

Consider the situation of local decision-making officials encountering several programs from Federal or state sources, all functioning to narrow their options. How can these officials act with impunity when the zone of negotiation for resolving conflicts among objectives is so drastically reduced? As Daniel Mandelker pointed out in the opening session: No agency, whether Federal or state, can for long preempt significant decision-making powers over public and private developments that have an overriding effect on the future shape of urban centers in this country. This same observation applies in efforts at setting up a metropolitan regional agency. Such an agency cannot survive long without a responsible relationship to local units of government and some viable form of public accountability.

A national land use policy act could provide important momentum in achieving an integrated regional approach to land use planning and coordinating land use control. S. 268 and H.R. 10294 from the last Congress will not do this. New wording or later amendments will be needed carrying a strong mandate for strengthening intergovernmental collaboration in land use planning and management. In the establishment of national guidelines under such legislation, states should be encouraged (through enactment of appropriate legislation and supportive action) to provide for the creation in metropolitan areas of a single regional base for integrative planning, decision-making, and regulatory action. This would be the basis for coordinating air quality with land use and transportation, not to mention a wide range of other programs. But in the establishment of guidelines for state and Federal land use planning programs, some kind of provision for an A-95 type review at the Federal level of the kind suggested by Norman Cooper would serve to reduce frustrations down the line. This kind of thrust would require complementing amendments to NEPA, transportation, and other legislation at the national level.

In brief, this conference has provided testimony of the need for coordination, consultation, and flexibility as key elements in developing an effective intergovernmental framework for achieving air quality. Coordination at the Federal, state, and metropolitan levels is needed in reducing the conflicts among the land use control objectives of different Federal programs, while providing the greatest possible latitude for accommodating them at the local level. This means placing an emphasis on intergovernmental collaboration in the formulation of state implementation plans. Finally, flexibility is needed in the implementation of programs. This might be achieved by introducing provisions in national legislation for staged implementation and by allowing for a progression of target dates fitted to the realities of local circumstances and the range of other objectives that localities must deal with.

Summary Remarks

C. Gorman Gilbert
University of North Carolina at Chapel Hill

Merely to summarize the dominant transportation issues discussed during this conference would alone be a formidable task. However, a meaningful summary cannot be restricted only to what was said during the conference, but rather it must recognize issues that were **not** discussed. In some cases the omission of certain transportation issues from the conference discussions is of equal importance to the issues which were discussed.

It is clear that one thing that has been said by many speakers during this conference is that transportation planning must focus on **demand** restrictions or alternatives. What was not called for were massive supply increases. This is not a novel idea among transportation planners but it is one which has been firmly voiced only in very recent years. Thus, it is significant—and comforting—to see this idea receive widespread acceptance by such a diverse group as this one. The reason for focusing on demand controls goes beyond the Clean Air Act; it includes the economic efficiency argument of refraining from further capital-intensive attempts to accommodate severe rush-hour demand peaks. Illustrative of this argument is Mr. Cooper's statement here that a one-hour extension of peak hours in Washington would extend existing bus capacity by 60 percent.

A related point made by Mr. Schofer and others is that transportation control strategies must be combined with public transit improvements. What was **not** a dominant issue was the need for radically new transit technology, a fact which indicates a departure from recent optimism that innovative transit technology might "solve" urban transportation problems. The evidence that a combined "control strategy—transit improvement" approach works exists in many places, including here in Chapel Hill. The Chapel Hill buses were built in 1958-59 and ran on the streets of Atlanta until this past August. They certainly do not qualify as "innovative transit technology." Yet, they carry 11,000 passengers/day or 3.5 passengers/route-mile. The reason: parking permits on campus were increased from $10 to $72!

The important issue of conflicting goals was raised by both Mr. Cooper and Mr. Schofer, although in different ways. Mr. Cooper pointed to goals of the Clean Air Act which are complementary with other national goals. Examples are: economic efficiency, energy conservation, fair pricing mechanisms, and increased mobility for persons without access to automobiles. Mr. Schofer, however, points out that travel reduction measures may produce inequitable alterations in mobility and, furthermore, may result in social effects which actually **degrade** the "quality of urban life." He poses a penetrating question: "Are there alternative options which will move us toward our air quality goals without negative impacts in other dimensions?"

A need commonly cited during the past two days is the need for revisions to the "planning process." These revisions include: (1) rationalization of Federal requirements imposed on local areas; (2) a delineation of responsibilities and roles of governmental organizations on all levels; and (3) better environmental impact prediction models. Mr. Schofer and Mr. Cooper both stressed the need for a local perspective on such impacts as well as a local commitment to achieving transportation and environmental goals. Significantly, only Mr. Schofer cited the need for better travel forecasting models, while Mr. Wickstrom argued that such modeling advances are **not** among the current methodological needs of local transportation planners.

There are two main conclusions which these issues suggest. The first has already been noted by at least one speaker: transportation is rapidly becoming a **management** activity rather than a **planning** activity. The dramatic switch of transit from the private to the public sector presents local decision-makers with the need to choose among several public transportation investment alternatives. Hence, a need arises for transit performance measures and investment criteria. Further, since capital-intensive alternatives are becoming less tenable, transit operators and planners are recognizing a need for activities such as transit marketing and low-cost service innovations.

A second conclusion is perhaps even more important. This very conference is but one result of **specific objectives** imposed on states. While we may argue ambient air quality standards and compliance deadlines, the fact remains that it is the **existence** of such standards and deadlines which has created action toward implementing air pollution abatement measures. There is, perhaps, a lesson to be learned from this experience for transportation planning; maybe transportation goals need similarly to be translated into specific objectives and standards. Maybe "increased mobility," "safe transportation," "efficient transportation," and other common objectives should be translated into values of such measures as: car occupancy, accidents per vehicle-mile, transportation energy per household, and percent work trips by transit. Such an explication of transportation goals provides impact measures which are meaningful on both regional and local levels and hence facilitates the interaction which Mr. Schofer calls for between the planning processes at these levels. Thus, we may some day find ourselves in a similar conference discussing how local areas can raise their car occupancy rates from 1.6 to meet a Federal requirement of an "ambient" car occupancy rate of 2.0.

Summary Remarks

Milton Heath

University of North Carolina at Chapel Hill

Speaking as a legislative lawyer, I perceive three major sets of alternatives emerging from the proceedings of this conference. The first alternative is the direct action, control-oriented approach extended into the area of changing people's life styles. The second and third alternatives approach the changing of life styles more indirectly and subtly. Alternative number two would involve developing an independent regional or local regional delivery system for incorporating air quality objectives into land use and transportation plans and the controls. Alternative number three would involve attaching air quality management to an existing larger system of land use and transportation planning and control, such as coastal zone management, and proceeding from that starting point.

I am well aware that these three compartments are not air tight, and that each of them shares in some elements of the others. But, in order to bring my points to issue, I am treating the alternatives as if they were separate.

The direct action approach would involve further intensification of existing controls, plus the added dimension of somehow linking them with land use and transportation controls without changing their basic thrust, and leaving them as EPA's responsibility. At this conference this viewpoint is best exemplified perhaps by Mr. Shueneman.

Mr. Shueneman and his counterparts are, as Ms. Haskell so nicely put it, unusual cops. They have learned to talk the jargon of planning, but one suspects that, if given their druthers, they would rather paint a planning gloss over their program and mission without changing its thrust. Ms. Goldman's comments are illustrative. Notice that she spoke, not of mixing air quality objectives in with other community objectives on a par, but of community development occuring within air quality constraints.

The second alternative is the middle ground approach of developing an independent local-regional delivery system for bringing air quality objectives into the land use and transportation control system. A good current example of this, though outside the air quality field, is the 208 planning process for waste water management.

One strength of the 208 planning process is that it seems to offer some hope of substantial involvement and initiative for local and regional agencies and people in the planning process. Another obvious strength of 208 planning is that, by isolating waste water management planning from other larger systems, it gives waste water planning some breathing space to work out its destiny during its formative stages. The other side of the coin is that this "isolation" may involve an extravagant expenditure of time and energy by many people.

Now, as to the third alternative of attaching air quality management to a larger system such as coastal zone management, in small ways this process is already underway. (For example, one of the statutory grounds for designating critical areas under the N. C. Coastal Management Act is the potentiality of frequent air inversions.) Aside from its possible long term merits, which may be considerable, I doubt that this approach offers a great deal for air quality maintenance in the immediate future. Air quality management itself is an infant program and needs time and breathing space for demonstration, experimentation, and early growth.

On balance, which, if any, is the preferred route to be followed among these three alternatives?

The direct action approach will continue and ought to continue within its spheres with independence and authority. My instinct, however, is that it will not succeed in taking over the entire field of land use planning and control—nor do I sense that the leaders of the environmental agencies wish to do so. At bottom this large and diverse country is probably not prepared to submit such an important aspect of life as land use and transportation policy to the jurisdiction of pollution control agencies, which are (appropriately) imbued with the directive, authoritarian, and hierarchic spirit of a police department. In the area of human activity under consideration at this conference, air quality management objectives will simply have to compete in the market place with other objectives.

Probably, for the short term, the middle ground approach modeled after 208 planning is the most promising. It gives air quality management needed breathing space and it offers sufficient involvement and local input to attract the interest of local people. Necessarily involved in such a process are tradeoffs or politics that are characteristic of competing value systems. If air quality management could be meshed with 208 planning itself, this would involve a considerable saving of time and frustration.

In the long run air quality management needs to be meshed with the larger systems of land use and transportation control through some vehicles such as coastal zone management or the national land use management legislation. Only through such a larger system can such important values as simplification and unification of permit and control systems be realized. If this cannot be achieved, eventually the entire stack of cards will come down.

Summary Remarks

David H. Moreau
University of North Carolina at Chapel Hill

I have been asked to make a few statements that summarize what has been said in this conference about air quality planning and a few more statements about implications for the future of what has been said.

First, let us look at what has been said about air quality. Very little has been said about present states of air quality, their relationships to air quality standards, and relationships between air quality standards and public health. Mr. Hawkins explicitly stated that public health is not negotiable, and other speakers have either explicitly or implicitly accepted existing standards as appropriate constraints to protect public health. Little has been said about the adequacy of standards for that purpose, nor has anyone taken a position that the standards are overly protective of public health. In the latter case high economic and other social costs may attend implementation of the standards with very small marginal benefits to public health.

Many of the speakers at the conference have stressed organizational arrangements for air quality planning and management. Mr. Mandelker pointed to the fact that the Clean Air Act is mute on intergovernmental relationships for land use controls. Relationships between state and local agencies were not specified, and he expressed the opinion that they will not be developed without congressional directives. Mr. Watt identified some of the interagency difficulties that have been experienced in the Bay area. He noted that although interagency arrangements have been made and technical personnel have made progress (although technical gaps remain) in coordinating their efforts, decision-making remains fragmented. These problems were attributed to variations in the nature of missions assigned to the participating agencies, ranging from regulatory responsibilities of environmental agencies, to planning and programming in transportation, to a consensus mission for the land use agencies.

The absence of an effective land use policy was pointed to on several occasions as the weak link in developing air quality management systems involving linkages among air quality, transportation, and land use. Mr. Cooper pointed to the fact that many transportation techniques that increase economic efficiency and conserve energy are highly complementary to the goal of reducing air pollution, and the general tenor of discussions in the conference would seem to suggest that progress is being made in coordinating planning in these two sectors. However, Mr. Hart has pointed to a failure to integrate land use and transportation planning, and Mr. Shofer noted that many transportation options are based on a reordering of urban land use. Similar difficulties of integrating water quality management and land use controls under Section 208 of the Federal Water Pollution Control Act were pointed out by me and others. Mr. Einsweiler gave us some good insights into the nature of Federal land policy as it exists and the reluctance of legislative bodies to enact strong land use policies. Much of the land use legislation is buried in environmental legislation and tends to identify areas in which people may not live. Positive planning to identify areas in which people may live and development of incentives to guide them there are coming more slowly, due in large measure to the political difficulties of telling people where they can live.

If this summary is an appropriate reflection of the conference and the conference is a true image of what is happening, then there would appear to be an undue influence of air quality (and water quality) in urban land use. Environmental planners will be pushed into the void of effective land use planning and controls to develop programs for achieving environmental goals if the latter remain viable over time. There would appear to be many adverse possibilities that are created by this form of planning model. Solutions appear to lie in the area of more effective land use planning and controls, but realization of that solution will require stronger legislative action.

Summary Remarks

Maynard M. Hufschmidt
University of North Carolina at Chapel Hill

The speakers and audience this morning have made my task of summarizing an easy one. Indeed, there is very little to add to the summaries of my colleagues. At the beginning of the conference I expressed the hope that we would make a good beginning at establishing communication between land use and transportation planners and air quality managers, and that we would discover opportunities for working together—complementarities—as well as problems and issues arising from the conflicts in objectives and programs.

We can all agree that good communication **was** established during the two and one-half days of sessions. The dialogues and broader interchanges in the formal sessions and the many informal contacts and meetings outside the formal sessions have served admirably to ventilate issues and to bring out diverse points of view in a stimulating environment. The fact that common understanding—to say nothing of agreement—was not fully achieved on all topics is more a reflection of the difficulties of communicating the true substance of complex issues between people of different professions and experience than it is of a basic limitation of the conference.

Certainly, the conference succeeded in identifying a list of major problems and issues that badly need resolution; it is not surprising that few general agreements were reached. Although some points of complementarity were identified—energy conservation, for example, was seen as contributing both to improved air quality and to better land use and transportation strategies—the conference did not find as many opportunities for mutually beneficial strategies as we had hoped it would. This means that much work still lies ahead.

I see this conference as but the beginning of a continuing interchange of information and points of view among land use and transportation planners and those concerned with air quality management. In this spirit, I formally adjourn the conference, with thanks to you all for your participation over the past two and one-half days.

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